DOCUMENT RESUME

ED 093 207 HE 005 643

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TITLE A Framework for Analyzing Postsecondary Education Financing Policies.
INSTITUTION National Commission on the Financing of Postsecondary Education, Washington, D.C.
PUB DATE May 74
NOTE 243p.
AVAILABLE FROM Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402 (Stock Number 5203-00026, $2.70)

EDRS PRICE MF-$0.75 HC-$11.40 PLUS POSTAGE
DESCRIPTORS *Data Bases; *Educational Finance; Educational Objectives; *Higher Education; *Models; *Post Secondary Education

ABSTRACT

The National Commission on the Financing of Postsecondary Education (NCFPE) developed a comprehensive analytical framework--a process--to evaluate the alternative financing proposals for postsecondary education. This staff report describes this framework, placing special emphasis on two of its major components--a data base and an analytical model. The data base includes data on postsecondary education, institutions, students, and sources of financing. Details are provided that indicate the ways in which the analytical model, a set of nonlinear, simultaneous equations, was used to project the impacts of various financing patterns on the achievement of those postsecondary educational objectives that can be measured quantitatively. The model, which operates through a time-sharing terminal, helps the analyst examine the impacts of key policy parameters on an interactive basis and obtain results immediately. Finally, this staff report explicates how the model may be used to evaluate several financing proposals as well as to assist in the construction of additional financing plans for postsecondary education. As background for the analysis, several key parameters of the complex decisions related to public policy are identified in this report, the applicable literature is reviewed, and new directions for research are indicated. (Author)

ED 093207

A Framework for Analyzing Postsecondary Education Financing Policies

A Staff Report
by Daryl E. Carlson,
James Farmer,
and George B. Weathersby

The National Commission
on the Financing of
Postsecondary Education

HE005 643

May 1974

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PREFACE

In their deliberations leading to the basic conclusions and recommendations of the National Commission on the Financing of Postsecondary Education, reported in Financing Postsecondary Education in the United States (Government Printing Office, December 1973), the Commissioners used staff prepared supplementary materials. This report is one of a series of staff reports prepared to make available these materials to a broader audience. And, although these reports do not necessarily reflect the views or recommendations of the Commission, it is the Commission's hope that publishing them will be a contribution to the current vigorous dialog on the financing of postsecondary education.

The National Commission on the Financing of Postsecondary Education (NCFPE) developed a comprehensive analytical framework--a process--to evaluate alternative financing proposals for postsecondary education. This staff report describes this framework, placing special emphasis on two of its major components--a data base and an analytical model. The data base assembled by the staff, as this paper outlines, includes data on postsecondary education institutions, students, and sources of financing. And this staff paper details the ways in which the analytical model, a set of nonlinear, simultaneous equations, was used to project the impacts of various financing patterns on the achievement of those postsecondary education objectives that can be measured quantitatively. As this paper illustrates, the model, which operates through a time-sharing terminal, helps the analyst examine the impacts of key policy parameters on an interactive basis and obtain results immediately. Finally, this staff report explicates how the model may be used to evaluate several financing proposals as well as to assist in the construction of additional financing plans for postsecondary education. As background for the analysis, several key parameters of the complex decisions related to public policy are identified in this report, the applicable literature is reviewed, and new directions for research are indicated.

It is the staff's hope that the Commission's analytical framework will be used by policy makers at local, state, and national levels. But an even more important outcome of developing this particular framework may be its use as a point of departure for structuring new models to aid decision making in the future.

ACKNOWLEDGEMENTS

Many individuals, institutions, associations, and governmental agencies have contributed to the Commission's work. Several organizations contributed data that served as the basis for the Commission's analysis. These include the Carnegie Commission; the College Entrance Examination Board; the Educational Testing Service; the state scholarship commissions in Washington, Oregon, California, Pennsylvania, and Illinois; the Council on Financial Aid to Education; the Bureau of the Census; the Federal Trade Commission; the Office of Management and Budget; and the National Center for Educational Statistics.

Data processing has been an especially important part of the Commission's support. The Commission is particularly grateful to James Jenkins of the Data Management Center of the Department of Health, Education, and Welfare; Sue Hais of the U.S. Office of Education; and Nick Corritori, Sally Bowman, and Nancy Curtis of the System Development Corporation, who gave willingly of nights, weekends, and holidays to ensure the flow of data and the availability of special data processing capabilities so vital to the Commission's work.

In addition, discussions with Vaughn Huckfeldt at the National Center for Higher Education Management Systems and Leonard Miller at the University of California have been helpful in the construction of the analytical model.

Without the contribution of these many people, the staff's work would not have been possible, and the staff extends to each of them its appreprіation.

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INTRODUCTION

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INTRODUCTION

After two decades of unprecedented growth, postsecondary education in the United States has become more than a $30 billion enterprise.* This was the estimated total amount of income to collegiate and noncollegiate institutions in 1971-72, the last year for which reasonably complete data are available. Of this amount, an estimated $5.9 billion was provided by students (after deducting student aid) in payment of tuition and other educational fees; $9.3 billion was provided by all state and local governments combined; $8.1 billion was provided by the federal government, $2.7 billion came from gifts and endowment income; and $3.5 billion came from auxiliary enterprises (such as campus book stores or cafeterias) and other institutional earnings.

The decision making processes involved in allocating these funds are quite complex. The federal funds, alone, are distributed through more than 380 federal financing programs. (Some of these funds have objectives other than financing postsecondary education per se. For example, the two largest federal student assistance programs are Veterans' benefits and Social Security survivor benefits.) And the fifty state public systems of postsecondary education as well as the local and private systems are supported by several hundred different financing programs. In addition, the enterprise's 10,000 institutions and 10,000,000 students and private philanthropy all make financing decisions critical to the overall financial status of postsecondary education.

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*For the purposes of its study, the National Commission on the Financing of Postsecondary Education has defined "postsecondary" to mean "the formal instruction, research, public service, and other learning opportunities offered by educational institutions that primarily serve persons who have completed secondary education or who are beyond the compulsory school attendance age and that are accredited by agencies officially recognized for that purpose by the U.S. Office of Education or are otherwise eligible to participate in federal programs." Two sectors--collegiate and noncollegiate--fit within this definition.

Financing decisions by some participants in the enterprise eventually affect most of the others. When, for example, an institution changes its tuition, the change affects the students' willingness to enroll in that institution. When governments change their policies for institutional aid, the change affects the institutions' willingness to accept additional students. When governments change their tax policies toward foundations and private donors, the change affects the amount of private support provided to postsecondary education. Despite the legal independence of institutions or students or legislators in making decisions, the decisions themselves are interdependent because they have an impact on all portions of the enterprise.

This concept of the interrelatedness of the decision-making process is one reason for the Commission's type of analysis and the basis of many of its findings. The Commission set out to provide a procedure for analyzing various financing plans, so that policy makers would have a framework in which to evaluate these plans, especially in terms of their possible impacts upon objectives for postsecondary education. Any significant change from current financing plans has consequences that must be anticipated. For instance, there is little value in drawing up a program of federal student aid intended to expand enrollment rapidly among low-income students without also ensuring that the institutions can and will accommodate the additional students and that other public and private aid will at least be maintained at current levels. Nor is there anything to be gained by proposing that large sums be spent to encourage institutional diversity if there are strong countervailing forces that effectively preclude real diversity no matter what level of funds are provided.

With its focus on interrelationships among participants, financing plans, and decisions about changes in the postsecondary education enterprise, the Commission's work had two principal outcomes, described in its final report, Financing Postsecondary Education in the United States:

- A recommended process for planning the financing of postsecondary education (called an "analytical framework"); and

A set of findings, based on quantitative and qualitative analysis, relevant to the current degree of achievement of objectives for postsecondary education, the current state of institutional financial distress, and some general characteristics of financing plans.

It is the purpose of this staff report to take a look at the first of these outcomes--the analytical framework. This staff report is divided into three main sections:

(1) An explication of the analytical framework. Two of the framework's main elements receive special attention: the data base compiled to implement part of the framework; and the analytical model, a mathematical construct, used to quantify some of the interrelationships encompassed by the framework.

(2) An application of the framework to the analysis of several financing plans; and

(3) A discussion of future research directions arising out of limitations of the framework, data base, and model. The appendixes detail segments of the framework, the data base, or the analytical model and their use.

It is the staff's hope that the analytical approach to planning embodied in the framework will prove useful to policy makers in institutions, at the local, state, and federal levels of government, and elsewhere. The framework is primarily a thought process that does not depend upon a rigid set of data. Rather, the data must reflect the decision making level of the policy maker using this approach and should be as current as possible. The framework is very flexible and should be able both to adapt to policy changes and to help policy makers anticipate the consequences of policy changes on their objectives.

1. ANALYTICAL FRAMEWORK

CHAPTER 1.

THE ANALYTICAL FRAMEWORK

The Commission has developed a procedure to provide policy makers with a systematic way to consider, analyze, and evaluate alternative financing proposals. This procedure, called an analytical framework, brings both quantitative and judgmental factors to bear on the complex decision making process in the financing of postsecondary education.

The Commission had to develop a vocabulary that would facilitate this rigorous quantitative and qualitative analysis of the complex patterns of financing. Part of this vocabulary was the identification of objectives for postsecondary education--to distinguish student access from student choice or student opportunity to complete a program once enrolled; or to distinguish institutional diversity from institutional independence and institutional accountability. Table 1 outlines the Commission's objectives and lists the staff's suggested measures of the degree of their achievement.

In its final report, the Commission chose, however, to use only those measures related to student access and choice, based on their assessment of the lack of reliability and inappropriateness of currently available information. This decision proved to be a major constraint on the Commission's quantitative analysis of alternative financing plans, particularly with respect to the accomplishment of institution-related objectives. In the judgment of these authors, it is better to use admittedly partial and inadequate measures for all objectives instead of omitting some objectives from the analysis and thereby implying that the omitted objectives are not important.

Also included in the Commission's development of a vocabulary were two classifications or taxonomies:

(1) The taxonomy of delivery mechanisms, arraying funds going directly to students in the form of grants, work, direct loans, guaranteed loans, or in other ways; or to institutions as general support, categorical aid, construction aid, or tax benefits; and

(2) A taxonomy of individual and institutional recipients and sources of funds, arraying the individual and institutional recipients by their characteristics and the federal, state, and local governments, students and their families, and private sources.

Such a basic vocabulary enables policy analysts to describe any of the currently proposed financing alternatives in terms of four characteristics: (1) the amount of money provided by each source; (2) the source of financing; (3) the delivery mechanism; and (4) the recipients. In operational terms, a financing policy decision specifies these four characteristics of financing programs; an alternative financing policy would specify different values for these same four characteristics. In fact, the staff assembled a computer data base of current federal and local financing programs in terms of these four characteristics.

There are several elements to the Commission's analytical framework. They deal with these ten questions regarding any proposed financing plan:

1. What are the basic objectives to be achieved? Objectives for postsecondary education could be expressed in terms of goals or overall characteristics. Believing that policy makers within each institution, the education enterprise, and the government at all levels can best define the purposes of their institutions, the Commission identified objectives, from a national perspective, and focused on their overall characteristics. (See Table 1 for a list of the Commission's objectives.)

2. What criteria should be used to determine achievement of the objectives? Measures of achievement--both quantitative and qualitative--are important to policy makers. With the exceptions of the measures for access and choice, the Commission did not use the measures suggested in Table 1. However, no more desirable quantitative substitutes were suggested. (See Chapter 5 for research suggestions to fill this gap in the analytical framework.)

3. What assumptions (quantitative and qualitative) should be made about changes in society and in the institutions themselves that

will affect the accomplishment of the objectives? The eighth element of the framework provides a procedure--the analytical or mathematical model--for systematically taking these kinds of changes into account. The model provides useful information about changes in projected enrollments; about such variables as costs and institutional productivity.

4. What general policies incorporating priorities among specific targets for objectives should be adopted? If access, for example, is a selected objective, what policies best achieve it: a reduction in tuition for all students, grants for low-income students, or some other policies? As decision makers select policies to accomplish stated objectives, they are also determining how much of the cost of education each student, institution, federal program, and other financing sources should bear.

5. What financing mechanisms most effectively serve the general policies? Financing mechanisms are the means by which assistance is delivered (such as loans or grants) to the recipients of assistance (such as students, institutions, or parents). For the taxonomy of recipients, see Tables 3 and 4. Institutions are categorized by the Carnegie Commission's institutional classification for the collegiate sector and the Office of Education's classification scheme for the noncollegiate sector. Students are categorized by age, sex, family income, ethnic group, and academic level (see Table 4). And for the Commission's taxonomy that arrays the means of assistance according to recipients, see Table 5.

6. What specific financing programs most effectively implement the financing mechanisms? The programs translate the mechanisms into practical decisions about the source of the funds, the level of financing, and the eligibility requirements. (See Chapter 4 below for the Commission's analysis of eight alternative financing plans.)

7. What are the relevant data regarding students, institutions, and programs? The Commission built the largest data base on postsecondary education ever before assembled to be able to link together and statistically analyze all available data. (See Chapter 2 below for a description of this data base.)

8. What are the important interrelationships between changes in financing and the responses of students, institutions, and sources of financing? For quantitatively determining these interrelationships, the Commission developed an analytical or mathematical model. As a result, the analytical framework provides useful information with respect to student responses to tuition changes (using price response coefficients). But at this stage of the framework's development, institutional responses to a variety of financing mechanisms cannot be estimated. (See Chapter 5 below for a description of data deficiencies and other limitations on the Commission's work.)

9. What measures should be employed to describe the extent to which alternative financing policies and mechanisms serve the chosen objectives? Where possible, quantitative measures should be used. For instance, as a check on access, one might compare the participation rate for students from families with annual incomes below some amount, for example $7,500, with the average participation rate of all other individuals in the 18 to 24 age group.

10. What special judgments should be made to condition acceptance of any proposed set of financing mechanisms and programs? Policy makers cannot depend upon quantitative analysis alone, for not enough data is always available. Where quantitative analysis leaves important questions unanswered, these questions must accordingly be decided on the basis of informed judgment.

The selection of objectives, criteria, and policies is largely judgmental and, therefore, primarily the responsibility of policy advocates and policy makers. The selection of financing mechanisms requires a mixture of judgment and technical knowledge. Determining the details of financing programs, preparing a data base, estimating interrelationships, and developing a set of measurements of the impact of alternative financing programs can be done best by those with technical knowledge in such matters.

In all, the framework provides for a systematic exploration of a number of complex interrelationships simultaneously. It uses a comprehensive data base and a mathemetical construct, termed an "analytical model," to estimate the anticipated effects of a number

of financing plans on the achievement of the national objectives for postsecondary education identified by the Commission. The framework does not itself evaluate the alternative plans, but it serves as a process for developing information adequate for policy makers to judge the relative desirability of any financing plan in terms of national objectives.

But a critical question about the framework remains: Is it practical and feasible? Can non-experts reproduce the process and conduct their own analyses? Our experience is limited, because policy makers have had only a few months to use the procedure and the specific analytical tools the staff has developed. However, the analytical framework can currently be used--at least in a rigorous conceptual manner--at the federal, state, and local levels.

As we have indicated, the analytical framework is a way of ordering one's thoughts about a major policy decision. The answers to the questions identified at the beginning of this chapter could be either (a) determined completely subjectively and expressed in sentences; or (b) determined in part subjectively and in part as a result of quantitative analysis, with the results expressed in sentences and in numbers; or (c) determined completely analytically and expressed completely in numbers or graphs. The first level, completely subjective, may be used by policy makers at any level and at the current time without awaiting further informational and technical developments. At the first level, the analytical framework has the capability of improving upon purely intuitive decisions by breaking apart complicated decisions into simpler components, allowing for a more rigorous decision.

However, most decisions are at the second level, part subjective and part quantitative, because some basic data exist at most levels of decision making. The results of the Commission's analysis is in this category--with neither all objectives nor all interrelationships quantified. In the coming years, the field of policy analysis will focus on (a) extending measurement to many more objectives, and (b) conceptually understanding and analytically describing the interrelationships among actions and consequences. In the meantime, the

data base and analytical tools developed by the staff provide a point of departure for federal, state, and local policy makers as they consider new alternatives for financing postsecondary education.

The third level, with completely quantified objectives, measures, and interrelationships, is far from a reality at the current time. The purposes of moving towards greater quantification are twofold: (a) to increase the degree of specificity in thinking, much as defining taxonomies gives a policy maker carefully differentiated words with which policies may be accurately described; and (b) to provide a structure in which observations of actual individual and institutional behavior (data) can be used to estimate statistically the key interrelationships.

A fully quantitative use of the framework, however, faces, at this time, two major obstacles:

- Identifying acceptable criteria to determine the extent of achievement of objectives (some criteria now exist, but the Commission could not agree that these should be used); and

- Developing a theory of how these criteria, financing decisions, and the broad context are interrelated (partial theories of interrelationships exist, but no integrative theory exists, to our knowledge).

The problem of identifying criteria has already been discussed, but the question of developing an adequate integrative theory remains particularly vexing. In making a financing decision, each policy maker has some implicit set of assumptions about the consequences of his or her decision; these assumptions are based on an even more implicit theory of how actions and consequences are interrelated. Behavioral decision making theories of educational institutions, relatively recent developments, so far provide an inadequate basis for planning in postsecondary education. Meanwhile, partial quantitative analyses can be conducted to illuminate some criteria and prove a somewhat firmer basis for judgment in the case of such objectives as student access, student choice, student opportunity, and shared responsibility, as shown in Chapter 4.

Table 1: National Objectives and Measures for Postsecondary Education

Objectives	Dimensions	Measures
1. ACCESS - Each individual should be able to enroll in some form of postsecondary education appropriate to that person's needs, capability, and motivation.	a) Student characteristics	--The percentage of population enrolled, classified by income quartile, sex, age, ethnic group, and by institutional type
	b) Level of program	--The percentage of population enrolled by level of program--lower division, upper division, and graduate/professional--classified by institutional type
2. CHOICE - Each individual should have a reasonable choice among those institutions of postsecondary education that have accepted him or her for admission.	a) Student characteristics	--The percentage of population enrolled, classified by income quartile, sex, age, ethnic group, and by institutional type
	b) Institutional characteristics	-- The number, percentage, and average enrollment of institutions by institutional type, size, control, and sex of student body (male, female, coeducational)
		--Average number of programs (according to a limited number of basic categories), classified by institutional type, size, control, and sex of student body

(Table 1, continued)

3. STUDENT OPPORTUNITY - Postsecondary education should make available academic assistance and counseling that will enable each individual, according to his or her needs, capability, and motivation, to achieve his or her educational objectives.	a) Program completion	--The percentage of program completions (number of degrees or certificates per number of students enrolled), classified by income quartile, ethnic group, sex, age, and type of institution*
	b) Counseling availability	--Expenditures per student for counseling, classified by type of institution
4. EDUCATIONAL DIVERSITY - Postsecondary education should offer programs of formal instruction and other opportunities and engage in research and public service of sufficient diversity to be responsive to the changing needs of individuals and society.	a) The variety of programs available to meet the needs of individuals and society	--The number of different programs in each institution (on the average by institutional type) --The age distribution of students
	b) The availability of these programs in different institutional settings	--Distribution of enrollment across institutional categories
5. INSTITUTIONAL EXCELLENCE - Postsecondary education should strive for excellence in all instruction and other learning opportunities, and in research and public service.	a) Faculty	--Surveys of faculty opinion
	b) Facilities	--Square footage per faculty member, dollars of capital per faculty member
	c) Students	--Success of graduates in obtaining employment

*This is not meant to imply that students who transfer to another institution or leave for other reasons may not have enjoyed a full measure of opportunity.

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(Table 1, continued)

6. INSTITUTIONAL INDEPENDENCE - Institutions of postsecondary education should have sufficient freedom and flexibility to maintain institutional and professional integrity and to meet creatively and responsively their educational goals.	a) Source of funds	--The percentage distribution of sources of funds classified by institutional type
	b) Availability of funds	--The average indebtedness on physical plant, classified by type of institution
		--The ratio of revenues to plant indebtedness, classified by type of institution
	c) Flexibility (the capacity to meet future needs in addition to continuing current services)	--The distribution of institutions' income between restricted and unrestricted income (categorical aid vs. general institutional support)
7. INSTITUTIONAL ACCOUNTABILITY - Institutions of postsecondary education should use financial and other resources efficiently and effectively and employ procedures that enable those who provide the resources to determine whether those resources are being used to achieve desired outcomes.	a) Financial accountability in the current time period	--Current fund expenditures per student, classified by institutional type
		--Current fund expenditures per degree granted, classified by institutional type
	b) Financial viability	--Number of institutions with revenues greater than expenditures, classified by institutional type
	c) Reporting requirements	--Compliance with major reporting requirements by institutional type

(Table 1, continued)

8. ADEQUATE FINANCIAL SUPPORT - Adequate financial resources should be provided for the accomplishment of these objectives. This is a responsibility that should be shared by a combination of public and private sources, including federal, state, and local governments, students, and their families and other concerned organizations and individuals	a) Institutional viability	—Number of institutions by type, number of programs by type and field
	b) Revenue distributions	--Current fund revenues per student by type of student and type of institution.

Table 2: Sources of Funds for Postsecondary Education

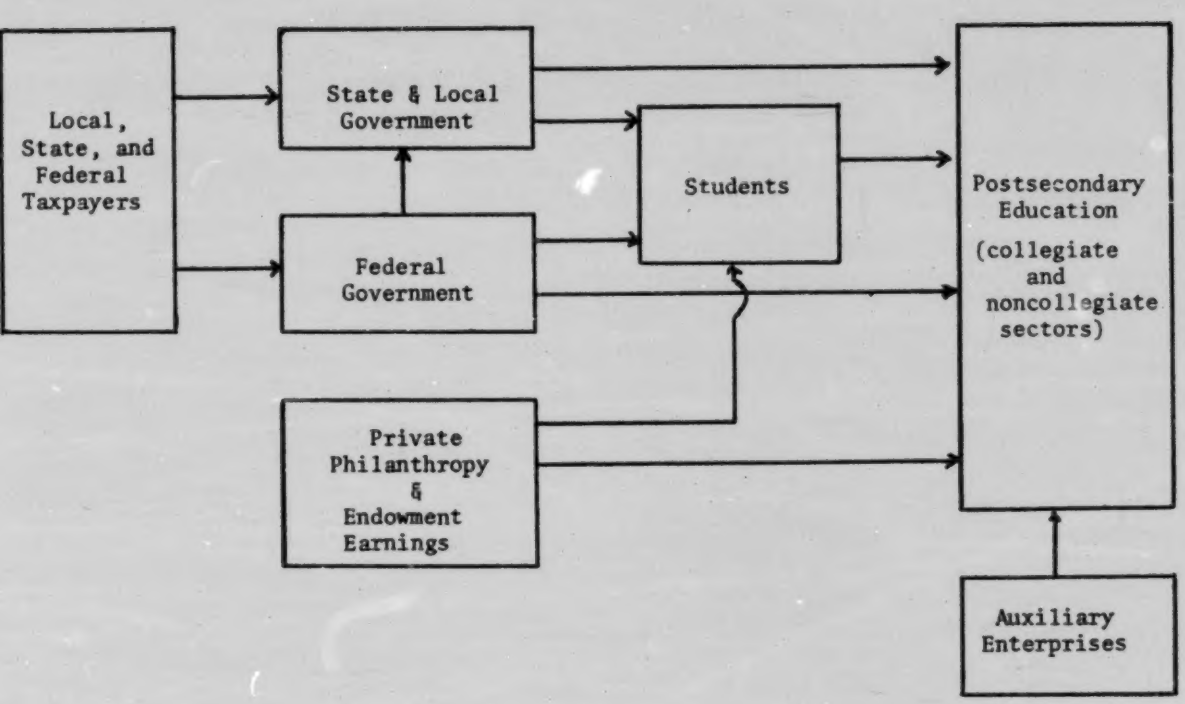

Table 3: Taxonomy of Institutional Recipients of Postsecondary Education Funds

A. Collegiate institutions, public and private

1. Leading research universities
2. Other research universities
3. Large doctorate granting institutions
4. Small doctorate granting institutions
5. Comprehensive colleges with substantial program offerings
6. Comprehensive colleges with limited program offerings
7. Selective liberal arts colleges
8. Other liberal arts colleges
9. Two-year colleges and universities
10. Professional schools and other specialized institutions

B. Noncollegiate postsecondary education: public, private nonprofit, and proprietary

1. Technical institutes and trade schools
2. Business and commercial schools
3. Cosmetology schools
4. Flight schools
5. Hospitals
6. Technical/vocational and other schools
7. Correspondence schools

C. Other postsecondary educational organizations

1. Local, state, and regional agencies
2. Other educational organizations

Table 4: Taxonomy of Characteristics of Student Recipients of Postsecondary Education Funds

A. Individual characteristics

1. Family income
2. Need
3. Ability
4. Age group
5. Sex
6. Ethnic group
7. Prior educational experience
8. Residence status

B. Prior academic participation

1. Part-time and full-time
2. Level of study (lower division, upper division, graduate)
3. Institutional type attended

Table 5: Taxonomy of Postsecondary Education Financing Delivery Mechanisms

I. Aid to Institutions

A. General institutional aid.

1. Tuition and fee payments
2. Budget appropriations
3. Lump sum grants
4. Various types of capitation grants
5. Grants based on other units of workload or output
6. Employment subsidies
7. Unrestricted gifts
8. Unrestricted earnings

B. Categorical aid (current)

1. Program support
2. Project grants and contracts
3. Service contracts
4. Restricted gifts
5. Restricted earnings

C. Construction aid

1. Project grants
2. Direct and indirect interest subsidies
3. Gifts
4. User charges

D. Tax benefits

1. Tax exemptions for institutions
2. Tax credits for donors
3. Tax deductions for donors

E. Other institutional aid

1. In-kind gifts
2. Use of property, facilities, or equipment
3. Cooperative services

(Table 5, continued)

II. Aid to Students

A. Grants and scholarships

1. Aid distributed directly to students based on

a. Need
b. Ability
c. Special purposes
d. Income

2. Aid distributed through institutions based on

a. Need
b. Ability
c. Special purposes
d. Income

B. Loans (subsidized portion)

1. Direct loans
2. Guaranteed loans
3. Institutional loans
4. Tuition deferrals

C. Tax benefits

1. Tax credits for families or students
2. Tax deductions for families or students

2. THE DATA BASE

CHAPTER 2

THE DATA BASE

A basic assumption underlying step 7 of the analytical framework is that the more information available to policy makers through a data base like the Commission's, the more informed and appropriate the decisions can be. Once again, this is not because data or analysis based on data should replace judgment in decision making; on the contrary, the analytical framework recommended by the Commission, incorporating the use of information, is intended to extend the judgmental capabilities of policy makers. Applying this philosophy, the development and use of the Commission's data base was an integral part of the research and analysis conducted by the staff.

The Commission's data base consists of twenty-three direct access computer files with about 110 million bytes (characters of data).* Any piece of information in the extensive data base can be accessed in a matter of seconds via interactive keyboard computer terminals. The information in the data base is as disaggregated as possible; it is organized and cross-indexed according to the taxonomies of financing mechanisms that were illustrated in Table 5.

The data files in the National Commission's data base fall into four categories:

(1) Collegiate institutional data dealing with enrollment, degrees, programs, finances, personnel, facilities, and certain institutional characteristics (such as instruction, research, public service, student services, plant operations, and administration). An institutional file based on the Higher Education General Information Survey (HEGIS) of the National Center for Education Statistics formed the basis of data for collegiate institutions.

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*For the current status of the Commission's data base, contact U.S. Office of Education, National Center for Educational Statistics, 400 Maryland Avenue, S.W., Washington, D.C. 20202.

[DEFINITION: In 1972-73, the collegiate sector consisted of 2,948 public and private institutions of higher education--including community colleges, four-year liberal arts colleges, major research universities, and professional schools--which enrolled over nine million students.]

(2) Noncollegiate institutional data dealing with enrollment, finance, programs, staff, completions, and placement. The noncollegiate institutional data are drawn from three sources: the Office of Education's Vocational Education Directory Survey; a survey of noncollegiate institutions by the Commission; and an earlier unpublished survey by the Carnegie Commission. Because the noncollegiate sector has so long been ignored by the public and private agencies that collect data on postsecondary education, there are no reliable figures on the distribution of students by age, sex, or program; nor are there figures indicating changes in enrollment. This Commission, the Carnegie Commission, and the U.S. Office of Education have begun a data collection effort, however, that within a year should begin to provide useful information regarding the students and institutions in this sector.

[DEFINITION: The noncollegiate sector of postsecondary education is made up of an estimated 7,016 occupational schools, which enrolled approximately 1.6 million students in 1972-73. All are either accredited by a federally-recognized accrediting agency (approximately 1,600 fall into this category) or have been otherwise classified as eligible for participation in the federal Veterans' benefits or Social Security student aid programs. The majority are operated for profit and are managed by corporations (66 percent), partnerships (18 percent), or single proprietors (16 percent).]

(3) Student data dealing with demographic characteristics, student aptitudes, sources of financial support, additional factors and current academic status. These detailed data are drawn from Census reports, Student Resource Surveys undertaken in four states under the supervision of the College Entrance Examination Board, and several other individual state financial aid studies.

(4) Financing data dealing with the various sources and delivery mechanisms of financing postsecondary education. These data have been collected from HEGIS reports, Bureau of the Census surveys, data provided by the Council for Financial Aid to Education, material provided by the Office of Management and Budget and other federal departments and agencies, and other sources.

See Appendix B for a list of the NCFPE data base files and a general description of their contents and availability, whether public or restricted. A detailed description of the files and the actual computer codes is available in a separate staff report, "NCFPE National Postsecondary Education Data Base Directory," from the Office of Education* or from the Government Printing Office.

Appendix D of this report briefly introduces potential users to the Commission's data base--describing the various software packages utilized by the staff for interacting with the massive data base and citing appropriate references for further information. An additional paper describing the general development of the data base and its use by the Commission is "Towards a National Data Base for Postsecondary Education" by Daryl Carlson, James Farmer, and Richard Stanton in the Proceedings of the 1973 CAUSE National Conference. The paper is available from the College and University Systems Exchange, 737 29th Street, Boulder, Colorado 80303.

All of the data are stored in a form unedited by the Commission staff. In the few months available to the Commission to complete its study, it had little opportunity to undertake massive new data collection efforts. Therefore, it assembled existing data sources and linked them together with common coding reflecting the taxonomies of delivery mechanisms, institutional categories, and individual recipient characteristics. It would be possible to perform a number of logical checks for these data using the computer to determine their internal consistency, though not their external validity. In the time available, the prior editing by each source was accepted as adequate.

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*To obtain a copy of the Data Base Directory, please contact: National Center for Educational Statistics, U.S. Office of Education, 400 Maryland Avenue, S.W., Washington, D.C. 20202.

Because the NCFPE data base is a collection of those data available instead of a careful definition and collection of those data needed for national policy, its contents should be viewed only as a point of departure for a national policy data base for postsecondary education. The main contribution of the NCFPE data base, in the opinion of these authors, was to make generally available much of the current data in postsecondary education and to show that on-line terminal operation of a very large data base is both technically and economically feasible. The terminal operation facility means that national data are readily accessible to federal, state, or local policy makers and their staffs, and to a broad research and analysis community.

Data Limitations

It was neither the role nor the responsibility of the Commission to design a new national data base. Rather, applying the analytical framework developed by the Commission required examining data about: (1) the current achievement of objectives; and (2) the interrelationships of policy changes and the probable changes in indicators of current objectives. Just as there are also inadequate data for current objectives, there are also inadequate data for current measures. In particular, there is a lack of data on student needs (in terms of which student access, choice, and opportunity were defined) and on the various institutional objectives (which have yet to have acceptable measures defined).

Conclusion

In summary, the major limitation of the data is that they are defined and collected prior to and independent of the Commission's choice of objectives. Data for national policy analysis should be defined in terms of the objectives to be pursued and the public policies available for influencing the attainment of the objectives--not the other way around. However, starting from available data, the staff of the Commission assembled a large data base which was

able to respond to important policy questions by making data accessible in an organized and efficient manner.

It was observed that a data base must be responsive to an analyst--on the order of seconds and minutes to a response--in order to support and reinforce the discovery process where greater understanding of the data occurs.

3. THE ANALYTICAL MODEL

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CHAPTER 3

THE ANALYTICAL MODEL: ELEMENT EIGHT OF THE ANALYTICAL FRAMEWORK

To apply the analytical framework to the development of policy recommendations, a mathematical construct was used by the Commission to estimate, in quantitative terms, the achievement of the objectives that would result from the implementation of a particular financing plan. This construct or analytical model--element eight of the analytical framework--addresses the question, "What are the important interrelationships between and among changes in financing and the responses of students, institutions, and sources of financing?" These interrelationships encompass the decision makers, the decisions, and their impacts on objectives.

While not all facets of these important interrelationships have been quantitatively derived, several have been. From these mathematical relationships, an analytical model was developed to estimate the enrollment and financial changes likely to occur as a result of changes in financing policies. This chapter describes the model itself and the next chapter illustrates the application of this model to the analysis of a variety of financing plans.

Constructing mathematical models to analyze public policies is not a new approach to research. But it has not, until recently, been employed by policy analysts to postsecondary education. Research models to determine the impacts of alternative financing policies for postsecondary education fit into these two categories:

--Partial impact studies, with special emphasis on the statistical analysis of some specific aspect of student, institutional, or governmental behavior. Also in this category are studies of the impact of certain legislation on the financing of postsecondary education. (For example, the work of Astin, et al. at the American Council on Education, and Lyman Glenny at the Center for Research and Development

in Higher Education, University of California at Berkeley.)

--Comprehensive impact studies, designed to assess the impact of different delivery mechanisms on students, institutions, and sources of financing, including units of government. (Inner City Fund, Mathematica, and National Center for Higher Education Management Systems have developed models of this sort.)

The National Commission--interested in the impacts that federal, state, local, and private financing have on student enrollment and student and institutional finances--developed the second type, a small comprehensive model. A brief summary of three such comprehensive models for analyzing national postsecondary education policies shows the current state of the art and places the Commission's model in perspective.

REVIEW OF POSTSECONDARY EDUCATION POLICY MODELS

Inner City Fund (ICF) has developed a model called BEST--Budget Enrollment Simulation Tool. They provide the following description[1] of BEST:

> BEST is a computer model which allows explicitly for....three types of adjustments to the pricing system:
> 1) adjust or begin payment of subsidies (e.g. capitation grants) to public and/or private colleges and universities,
> 2) adjust student tuition and fee charges at public institutions, or
> 3) adjust the level of funding and the criteria for distributing student financial aid revenues.
>
> Its (BEST) final output is a comparison of the before/after levels of enrollment and public expenditures. Enrollments and expenditures are broken down by the parental income class of the student and by three major types of colleges and universities--public and private senior institutions and community colleges. The model applies explicitly to the population of high school graduates. If the ratio

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[1] G. Barnes, E. Erickson, W. Hill, Jr., and H. Winokur, Jr., "Further Analysis of the College Going, College Choice Model," ICF Incorporated, December 1972.

of freshmen to total enrollment is taken to be 1:3, then simple multiplication of the final enrollment and expenditures data should provide a suitable prediction for all undergraduates.

The input requirements are not extensive. The entire model runs on 76 data elements. Users of the model, by making assumptions about the probable change of certain parameters can project their results into the future. Where there are regional differences in institutional characteristics or in demographic characteristics, data inputs may be adjusted to reflect these differences.

BEST is designed to translate the assumed changes in tuition and student financial aid policies into changes in the option prices faced by the prospective students. These price changes, given the price response parameters, cause a redistribution of student enrollments and hence in the public expenditures which support the enrollments.

Mathematica has also developed several enrollment and financial aid models for higher education. These models are illustrated in Tables 6 and 7. The undergraduate enrollment model forecasts total undergraduate full-time enrollment in higher education by sex, family income, and institutional type and control. One of the principal uses of the undergraduate enrollment and financial aid models is to estimate the costs of alternative Federal student aid programs.

Currently both the undergraduate enrollment and financial aid models are programmed on a time-sharing interactive system. This allows the user to determine:

1) the impact of changes in enrollment model parameters (such as enrollment and attrition rates) on the financial needs of students;

2) the impact of changes in financial model parameters (such as student contribution from summer employment) on the financial needs of students;

3) and the costs of alternative Federal aid programs.[2]

The National Center for Higher Education Management Systems (NCHEMS at WICHE) is currently in the process of constructing a

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[2] Mathematica, Inc., "Enrollment and Financial Aid Models for Higher Education," August 1971.

Table 6. Undergraduate Student Enrollment And Aid Models by Mathematica

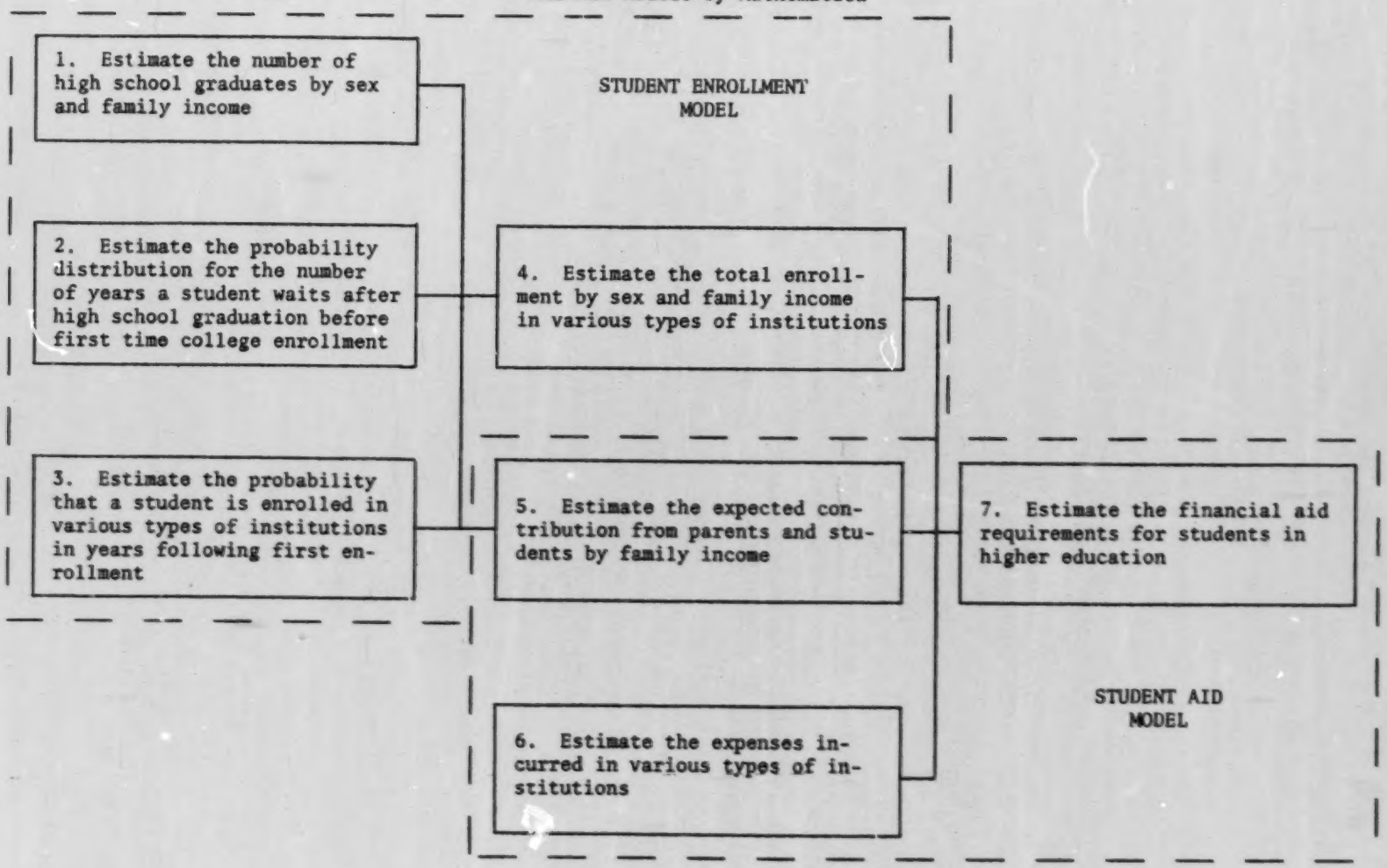
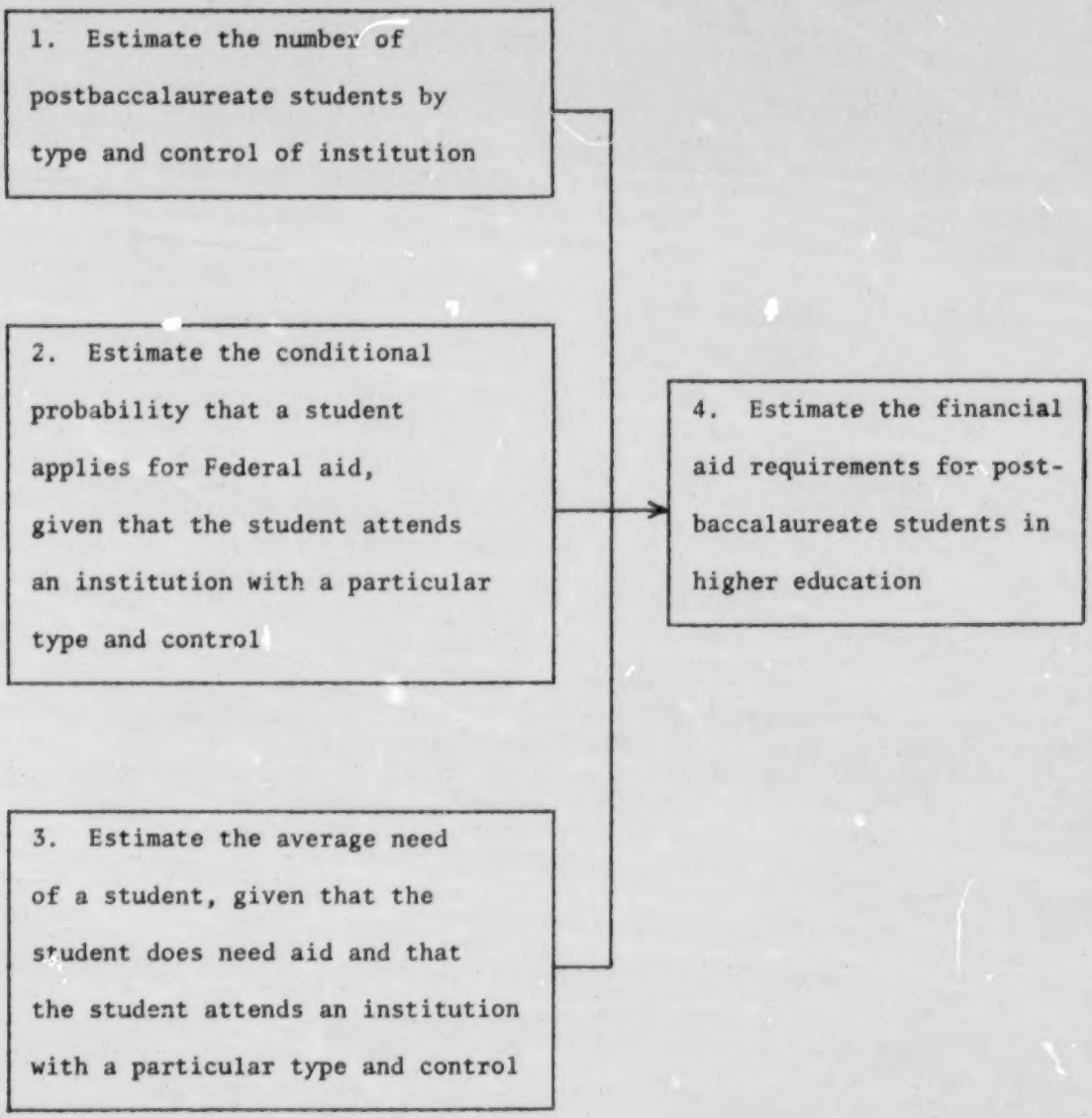

1. Estimate the number of high school graduates by sex and family income
STUDENT ENROLLMENT MODEL
2. Estimate the probability distribution for the number of years a student waits after high school graduation before first time college enrollment
4. Estimate the total enrollment by sex and family income in various types of institutions
3. Estimate the probability that a student is enrolled in various types of institutions in years following first enrollment
5. Estimate the expected contribution from parents and students by family income
7. Estimate the financial aid requirements for students in higher education
STUDENT AID MODEL
6. Estimate the expenses incurred in various types of institutions

Table 7. Postbaccalaureate Student Enrollment and Aid Models by Mathematica


1. Estimate the number of postbaccalaureate students by type and control of institution
2. Estimate the conditional probability that a student applies for Federal aid, given that the student attends an institution with a particular type and control
3. Estimate the average need of a student, given that the student does need aid and that the student attends an institution with a particular type and control
4. Estimate the financial aid requirements for post-baccalaureate students in higher education

"national planning" model for higher education. In a preliminary documentation of their work,[3] the model is described in these terms:

> The prototype model operates as follows: first, the model allows the user to input a given level and mix of federal, state, and private financing programs for certain groups of institutions and students. Next, the model considers the planning alternatives of the institutions as they try to meet their institutional goals in light of available funds. Examples of the institutional planning decisions made in the model are hiring new faculty, providing for academic support, admitting students, and providing financial aid. A set of institutional goals is included as an integral part of the model, and the institutional planning decisions are made to best achieve the goals. The selection of an institutional operating plan is based on an extension of the research reported in Optimality in College Planning: A Control Theoretic Approach, (Wagner and Weathersby, 1971).
>
> The model next considers the possibilities open to students as they choose the type of institution they will attend. This portion of the model is based on the research report, Demand for Higher Education in the United States (Miller, 1971). The students consider the cost of attending a particular type of institution, the average ability of the student body at that particular type of institution, and their own individual ability and income level. These criteria have demonstrated the best ability to predict which institutions students will choose to attend.
>
> The model next combines the institutional spaces available, or the supply of education as determined from the institutional component of the model, with the demand for education as determined by the students selecting particular institutional types. This supply-and-demand interaction formulates the enrollment to higher education, from which one can determine the following:
>
> 1) the general level of enrollment in each type of institution,
>
> 2) the number of empty spaces in each type of institution,
>
> 3) the income and ability level of incoming students, and
>
> 4) the income and ability of persons who are not currently being served by higher education.

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[3] V. Huckfeldt, "Preliminary Data for a Federal Planning Model for Analysis of Accessibility to Higher Education," National Center for Higher Education Management Systems, 1973.

Thus, each combination of alternative financing plans produces an interaction between the students, institutions, state, and federal government enabling evaluation of the impact on accessibility and institutional viability of each plan.

THE COMMISSION'S MODEL

The Commission's model initially sought to relate a large number of financing policy variables to quantitative measures of the degree of achievement of postsecondary educational objectives. In the absence of adequate theory and data, the model was limited to estimating the enrollment and financial consequences of changes in national financing policies, particularly those policies relating to student grants. Essentially, the model estimates the enrollments by income group, student level, and institutional sector that would probably result from a combination of tuition and student aid (grants, work, loans) policies; it also estimates the change in the net cash balance in each institutional sector resulting from changing enrollments, tuitions, and institutional support policies. The model was designed for this limited set of policy concerns--enrollments, tuitions, and institutional support policies. As the changes in policy concerns take place and as new theories and data are developed, new analytical models will be needed. The model described in this chapter may be of assistance as a point of departure for the structuring of new models. However, it is more likely that for the next round of policy analysis, a new model should be designed to be consistent with the new policy questions. Therefore, the purpose of this section is to describe just one particular analytical model used for policy analysis.

The first time the staff attempted to analyze the enrollment and financial implications of alternative financing plans, they developed a series of work sheets and completed all calculations by hand. A very simple financing alternative took about one person-month to evaluate. However, each person manipulated it differently, and each made numerical errors. Further, the evaluation of each alternative financing plan was limited to relatively simple mathematics.

A computer model was written both to decrease the time and cost of calculation and to increase the reality of the conceptualization, which required increasingly complex algebra.

1. Logic of the Model

The calculations were performed recognizing various categories of students and institutions, and these categories are described in the following section. The multiple categories increase the complexity of the algebra but not the logic. Therefore, the discussion of the logic of the model will be presented as simply as possible, leaving to a subsequent section on model equations the task of incorporating all the multiple categories.

Enrollments were first divided into two groups: one group eligible for the projected change in student aid and one group not eligible for the change in student aid. As a result of policy changes in tuitions and the level of financing of student aid, there resulted in each sector a new total enrollment made up of two groups: (1) the number of students eligible for (and receiving) the change in student aid and facing the change in tuition; and (2) the number of students facing the change in tuition without any change in student aid. The amount of change in tuition was a policy decision set by the user of the model, presumably by state and institutional decision makers. The amount of the change in student aid provided per eligible student of various economic and social characteristics was determined by the model subject to the following considerations:

a. The additional resources available for a change in student aid came from the following sources: (1) some proportion of the additional tuition revenues paid by the new total enrollment after changes in tuition and student aid; (2) the change in government appropriations for student aid.

b. The change in student aid was assumed to be distributed on a basis of the financial need of students. This financial need was approximated by an equation that was proportional to increases in tuition and inversely proportional

to increases in income. In other words, as tuition increased or income decreased, the financial need of a student would increase. The BEOG Family Contribution Schedule or other needs analysis tables were not used because of their complexity (for example, the inclusion of the number of children in the family and the treatment of family assets). Of course, many different patterns of distributing financial aid could be (and were) considered.

c. The maximum size of the student aid award (grant, work, or loan) was specified as part of the student aid policy.

These three considerations along with the specified functional forms of the equations provided enough information to determine the average student aid award per eligible student by (family) income, student level, and type of institution. The average student aid award in combination with the change determined by the policy under consideration provided enough information to estimate the new total enrollment by student (family) income, student level, and type of institution. (Student income distributions could be used by the model instead of family income distributions if that information were available.)

Next, the model turns to the question of changes in institutional finance. The calculations imply no judgment about the degree of adequacy of the current levels of institutional finance. Rather, the calculations estimate the net change in revenues and costs associated with changes in institutional support policies, changes in tuition policies, and changes in student enrollment demand, which may be affected by student aid policies. The net change in revenues and costs is the result of several factors:

a. The new total enrollment in each sector after tuition and student aid changes may be greater or less than the anticipated total enrollment before these changes. The increment (or decrement) in total enrollment will affect tuition

revenues in two ways. If we adopt the following symbols for each sector:

E = total enrollment, before tuition and student aid policy changes

dE = change in enrollment as a result of tuition and student aid policy changes

p = tuition price

dp = change in tuition price,

then the student-based revenue to the institution before tuition and student aid policy changes is Ep. The student-based revenue to the institution after tuition and student aid policy change is (E+dE) (P+dp). However, some of the revenue associated with the change in tuition may be used for student aid; say α% of (E+dE) dp is available for institutional support. Therefore, the net change in revenues available to institutions from student sources is:

$$(E+dE)p + \alpha(E+dE)\ dp - Ep$$

which is simply

$$pdE + \alpha(E + dE)\ dP$$

b. The change in direct institutional public subsidy (or appropriation) will clearly change the revenues available to an institution.

c. The change in total enrollment will change the costs to institutions. The model simply calculated the product of the change in total enrollment times the average cost to the institution per additional student. This induced cost could exceed or fall short of student-based revenues. The calculations assured that when induced costs exceeded student based revenues, these extra costs were covered from other sources in proportion to the degree in which prior operating support was provided by each of the other sources. The induced effects may be contrary to stated public policy for several public policies may conflict

with each other. For example, a public policy of using student aid to expand enrollments (thereby inducing institutional costs) while at the same time reducing direct institutional support is clearly in conflict with itself. The model assumed the induced costs should be covered; therefore, all institutional financial support decisions included covering induced costs.

The model was programmed with the capability of evaluating the enrollment and financial impacts of policy changes for the years 1974-1985 and displaying the results of its analysis for any three of these years. Only steady state conditions were calculated because the intermediate term efforts were believed to be of greater relevance to policy than the short term (transient) effects, such as how freshmen would be affected differently from sophomores. The other key assumptions of the model are discussed in a later section of this chapter, following a discussion of the variables and equations used in the calculations.

2. Variables Used in the Model

Tables 8 through 14 present the variables used in the model. These variables fall into three general categories: baseline data (state variables describing the major characteristics of enrollments and finance), price response coefficients, and the financing policy variables determined by the user.

Common categories or dimensions of the variables are used in the analysis of all policy alternatives. The particular set of institutional categories listed in Table 8 are chosen to be the smallest number of categories consistent with useful analysis of financing policies. Tuition, student aid, and institutional aid policies are stated in a form that differentiates between public and private institutions, between two-year and four-year institutions, and among student levels (lower division, upper division, and graduate). The family income categories in Table 8 correspond to those used by the general Census surveys, which have been applied

to students attending postsecondary education institutions. Algebraic symbols are given for all of the variables appearing in Tables 8 through 14. These symbols correspond to those used in the variable definitions (Table 15) and in the model equations (section 3).

Variables in the Baseline Data

Tables 9 through 12 array the baseline data used in the formulation of the model; they extrapolate to 1977 and 1980 (the two years used most frequently in the Commission's analysis*) the 1972 financing patterns, levels, and trends. These baseline data include projected enrollments, tuition, instructional costs, and governmental appropriations. The extrapolated figures for enrollments assume that the 1973 enrollment projections of the National Center for Educational Statistics for the collegiate sector (which were based on actual enrollments in 1972) will hold for 1977 and 1980. Because no official noncollegiate enrollment forecasts exist, the extrapolated figures assume that noncollegiate enrollments will increase at the same rate as the general population. For some variables, the baseline data may be used as reference points against which the impacts of alternative financing plans on objectives are measured. These baseline data are stored in a separate NCFPE data file. For normal use of the model, and, with the exception of tuition policy changes, they need not be altered. However, any of these figures can easily be changed if one desires to use the model under different baseline assumptions.

Price Response Coefficients

The National Commission's model requires coefficients reflecting the most likely change in forecasted enrollment resulting from changes in prices for attending postsecondary education institutions.

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*Fiscal year 1977 was judged to be the first year substantive changes could be implemented nationally, and 1980 was chosen as a basis for comparison with other national policy studies which used 1980 as a benchmark year.

Table 8: Institutional and Family Income Categories

Institutional Categories

(1) Public two-year
(2) Public four-year, lower division
(3) Public four-year, upper division
(4) Public four-year, graduate
(5) Private two-year
(6) Private four-year, lower division
(7) Private four-year, upper division
(8) Private four-year, graduate
(9) Non-collegiate

Family Income Categories (m) and Midpoints (Ym):

(1)	$ 0	-	999	$ 500
(2)	$ 1,000	-	1,999	1,500
(3)	$ 2,000	-	2,999	2,500
(4)	$ 3,000	-	3,999	3,500
(5)	$ 4,000	-	4,999	4,500
(6)	$ 5,000	-	5,999	5,500
(7)	$ 6,000	-	7,499	6,750
(8)	$ 7,500	-	9,999	8,750
(9)	$10,000	-	14,999	12,500
(10)	$15,000	-	24,999	20,000
(11)	$25,000	-	over	50,000*

*Chosen to represent the median income of those families or individuals earning more than $25,000 per year.

Table 9: Projected Baseline Enrollment
(In Thousands of Students)

	Institutional Category								
Year	1	2	3	4	5	6	7	8	9
1974	1,763	1,797	1,613	1,083	95	824	646	549	1,632
1975	1,836	1,810	1,624	1,091	92	832	652	554	1,662
1976	1,913	1,832	1,645	1,104	94	839	658	560	1,698
1977	1,990	1,857	1,666	1,119	97	849	666	566	1,732
1978	2,056	1,881	1,688	1,133	98	860	675	574	1,767
1979	2,108	1,894	1,699	1,115	99	868	681	579	1,802
1980	2,138	1,894	1,700	1,114	100	867	680	578	1,838
1981	2,155	1,890	1,697	1,140	100	863	677	576	1,875
1982	2,162	1,874	1,682	1,129	99	859	674	573	1,912
1983	2,196	1,845	1,656	1,112	97	845	663	563	1,950
1984	2,106	1,807	1,622	1,089	95	823	645	549	1,990
1985	2,052	1,760	1,580	1,060	93	793	622	528	2,029

SOURCE: Projections published by the National Center for Educational Statistics, U.S. Office of Education; apportioned to institutional sectors by NCFPE staff.

Table 10: Percentage Distribution of Enrollment Across Family Income Categories*

Income Category	Institutional Category								
	1	2	3	4	5	6	7	8	9
1	0.6	0.7	0.7	0.3	0.0	0.2	0.2	0.0	1.3
2	1.2	1.5	1.5	0.6	4.2	1.0	1.0	2.4	1.9
3	2.5	1.6	1.6	1.1	1.4	2.9	2.9	0.8	2.5
4	3.9	3.0	3.0	2.3	1.4	3.2	3.2	0.0	4.5
5	4.5	5.0	5.0	3.6	0.0	2.2	2.2	2.4	5.4
6	4.5	4.7	4.7	2.7	2.8	3.8	3.8	4.8	5.1
7	8.2	6.4	6.4	5.1	9.7	5.5	5.5	3.2	9.4
8	13.8	13.7	13.7	12.2	13.9	10.7	10.7	9.6	15.8
9	33.0	28.0	28.0	33.9	31.9	27.6	27.6	32.0	30.2
10	20.8	24.5	24.5	29.7	19.4	25.7	25.7	28.0	18.7
11	7.0	10.9	10.9	8.5	15.3	17.2	17.2	16.8	5.2
	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

SOURCE: U.S. Bureau of the Census, "Current Population Survey," October 1972, special tabulations.

*The data from this table is combined with the data from Table 9 to compute the baseline enrollment for each institutional category and income category (n^b_{im}) for each year.

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Table 11: Baseline Tuition and Cost Data, by Institutional Category

Institutional Category	Tuition (T_i)	Net Price (NP_i^o)	Average Institutional Cost Per Student (AC_i)
1	$ 145	$ 119	$1,501
2	440	317	1,533
3	440	317	2,300
4	440	317	4,600
5	1,538	1,238	2,163
6	1,538	1,238	2,019
7	1,538	1,238	3,029
8	1,538	1,238	6,057
9	1,000	1,000	1,000

SOURCE: HEGIS, U.S. Office of Education, Financial Statistics of Institutions of Higher Education, (1971-72)

Table 12: Baseline Governmental Appropriations, by Institutional Category* (Thousands of Dollars)

Institutional Category	Federal Revenues	State Revenues	Local Revenues	Private Revenues
1	105,643	900,000	2,234	7,670
2	103,113	2,535,885	672	46,915
3	85,805	2,110,240	559	39,040
4	54,847	1,348,875	358	24,955
5	4,073	1,000	984	33,923
6	42,360	108,521	435	388,796
7	32,352	82,880	332	296,932
8	26,387	67,599	271	242,186
9	0	31,811	0	772

SOURCE: HEGIS, U.S. Office of Education, Financial Statistics of Institutions of Higher Education (1971-72)

*Federal revenue (PF_i), state revenue (PS_i), local revenue (PL_i), and private revenue (PP_i) baseline proportions of total institutional revenues are calculated from the above table.

Conceptually, these coefficients are variable across many dimensions including family income categories as well as across institutional categories. Also, the price changes in one institutional category cause inverse effects on enrollments in other, comparable institutional categories. That is, as the tuition in public 4-year institutions increases, the enrollment in private 4-year institutions would most likely increase, since the private institutions would be relatively less expensive.

The set of price response coefficients utilized in the Commission's model were derived from data presented in a paper by Miller[4] by computing partial derivatives of Miller's estimated probability functions with respect to price.* Because the Commission's model utilized baseline postsecondary education enrollment rather than high school enrollment, the following manipulation of coefficients was required:

$$HSE \cdot P = BE \text{ or } HSE = BE/P$$

and $$HSE \cdot (P + ap/ac) = BE'$$

$$\therefore \quad (BE/P)\ (P + ap/ac) = BE'$$

or $$BE\ (1 + \frac{ap/ac}{P}) = BE'$$

where HSE = high school enrollment

P = proportion of HSE attending postsecondary education

BE = baseline postsecondary education enrollment

ap/ac = the change in the proportion, P, resulting from a change in the cost of attendance, C

BE' = enrollment after change in C

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[4] L. Miller and R. Radner, "Demand for Places: Summary of Results," draft of Chapter 2 of forthcoming book, University of California at Berkeley, 1974.

*See Appendix A for a discussion of the pertinent student demand studies.

Therefore, it was necessary to calculate the ratio of the partial derivative of the probability with respect to cost to the actual probability level. A detailed description of the calculations performed in adapting the Miller-Radner estimates for use in the Commission's model is given in Appendix C and the resulting coefficients used in the model are presented in Table 13. Three matrices of coefficients are utilized; one for each of three family income levels. Each matrix is square with the dimension equal to the number of institutional categories. The diagonal elements are the direct price response coefficients reflecting the change in enrollment for an institutional category given a change in its price. The off-diagonal elements are the indirect price response coefficients reflecting the change in enrollment for one institutional category given a change in the price of some other institutional category.

Users' Financing Policy Variables

The spectrum of policy variables specified by the user are listed in Table 14. This table suggests the many policy alternatives that can be analyzed by the model. To simplify using the model, entries need only be made for those policy variables that the user wants to change from the baseline value.

Summary of Variables

Complete definitions for all the variables utilized in the model are listed in Table 15. Note that all of the exogenous variables have already been described in Tables 8-12. Table 15 displays the complexity of variables involved in even a simple model of postsecondary education.

In the version of the model used by the Commission for the policy evaluation, the β and ℓ coefficients used in equation 7 were set equal to the α coefficients. In other words, no distinction was made between the price response coefficients of (potential) students depending on the type of aid received (grant, loan, or work). This assumption was made because no empirical work was found that would yield differentiated

Table 13a: Price Response Coefficients for Low Income Students (<7,500)*

Institutional Category	Institutional Category								
	1	2	3	4	5	6	7	8	9
1	-2.95	0.32	0.0	0.0	0.22	0.16	0.0	0.0	0.22
2	0.51	-3.13	0.0	0.0	0.22	0.16	0.0	0.0	0.22
3	0.0	0.0	-3.13	0.0	0.0	0.0	0.16	0.0	0.0
4	0.0	0.0	0.0	-3.13	0.0	0.0	0.0	0.16	0.0
5	0.51	0.32	0.0	0.0	-3.24	0.16	0.0	0.0	0.22
6	0.51	0.32	0.0	0.0	0.22	-3.26	0.0	0.0	0.22
7	0.0	0.0	0.32	0.0	0.0	0.0	-3.26	0.0	0.0
8	0.0	0.0	0.0	0.32	0.0	0.0	0.0	-3.26	0.0
9	0.51	0.32	0.0	0.0	0.22	0.16	0.0	0.0	-3.24

* Price response coefficients (α_{ijm}) represent the percentage change in enrollment given a $100 price increase.

Table 13b: Price Response Coefficients for Middle Income Students (7,500 - 15,000)*

Institutional Category	Institutional Category								
	1	2	3	4	5	6	7	8	9
1	-1.23	0.15	0.0	0.0	0.09	0.13	0.0	0.0	0.09
2	0.13	-1.22	0.0	0.0	0.09	0.13	0.0	0.0	0.09
3	0.0	0.0	-1.22	0.0	0.0	0.0	0.13	0.0	0.0
4	0.0	0.0	0.0	-1.22	0.0	0.0	0.0	0.13	0.0
5	0.13	0.15	0.0	0.0	-1.28	0.13	0.0	0.0	0.09
6	0.13	0.15	0.0	0.0	0.09	-1.24	0.0	0.0	0.09
7	0.0	0.0	0.15	0.0	0.0	0.0	-1.24	0.0	0.0
8	0.0	0.0	0.0	0.15	0.0	0.0	0.0	-1.24	0.0
9	0.13	0.15	0.0	0.0	0.09	0.13	0.0	0.0	-1.28

*Price response coefficients (α_{ijm}) represent the percentage change in enrollment given a $100 price increase.

Table 13c: Price Response Coefficients for High Income Students (>15,000)*

Institutional Category	Institutional Category								
	1	2	3	4	5	6	7	8	9
1	-0.75	0.09	0.0	0.0	0.05	0.09	0.0	0.0	0.05
2	0.06	-0.71	0.0	0.0	0.05	0.09	0.0	0.0	0.05
3	0.0	0.0	-0.71	0.0	0.0	0.0	0.09	0.0	0.0
4	0.0	0.0	0.0	-0.71	0.0	0.0	0.0	0.09	0.0
5	0.06	0.09	0.0	0.0	-0.76	0.09	0.0	0.0	0.05
6	0.06	0.09	0.0	0.0	0.05	-0.71	0.0	0.0	0.05
7	0.0	0.0	0.09	0.0	0.0	0.0	-0.71	0.0	0.0
8	0.0	0.0	0.0	0.09	0.0	0.0	0.0	-0.71	0.0
9	0.06	0.09	0.0	0.0	0.05	0.09	0.0	0.0	-0.76

*Price response coefficients (α_{ijm}) represent the percentage in enrollment given a $100 price increase.

Table 14: Policy Variable Formats

(1) New tuition levels (P_i) and the proportion of additional tuition revenues to be redistributed as student aid (PT_i):

Institutional category	PT_i	New Tuition Level Year 1[a]	Year 2[a]	Year 3[a]
Public two-year	x	x	x	x
Public four-year, lower division	x	x	x	x
Public four-year, upper division	x	x	x	x
Public four-year, graduate	x	x	x	x
Private two-year	x	x	x	x
Private four-year, lower division	x	x	x	x
Private four-year, upper division	x	x	x	x
Private four-year, graduate	x	x	x	x
Non-collegiate	x	x	x	x

[a] Year 1, 2, 3 represent user determined years between 1974-1985.

(2) Additional Federal institutional aid (FI_i):

Institutional category	Code[a]	Dollars of Aid Year 1	Year 2	Year 3
Public two-year	x	x	x	x
Public four-year, lower division	x	x	x	x
Public four-year, upper division	x	x	x	x
Public four-year, graduate	x	x	x	x
Private two-year	x	x	x	x
Private four-year, lower division	x	x	x	x
Private four-year, upper division	x	x	x	x
Private four-year, graduate	x	x	x	x
Non-collegiate	x	x	x	x

[a] Code to indicate whether aid is a block grant, a capitation grant, or a per-student grant.

(Table 14, continued)

(3) Additional State institutional aid (SI_i):

Institutional category	Code[a/]	Dollars of aid Year 1	Year 2	Year 3
Public two-year	x	x	x	x
Public four-year, lower division	x	x	x	x
Public four-year, upper division	x	x	x	x
Public four-year, graduate	x	x	x	x
Private two-year	x	x	x	x
Private four-year, lower division	x	x	x	x
Private four-year, upper division	x	x	x	x
Private four-year, graduate	x	x	x	x
Non-collegiate	x	x	x	x

[a/] Code to indicate whether aid is a block grant, a capitation grant, or a per-student-aided grant.

(4) Additional local institutional aid (LI_i):

Institutional category	Code[a/]	Dollars of aid Year 1	Year 2	Year 3
Public two-year	x	x	x	x
Public four-year, lower division	x	x	x	x
Public four-year, upper division	x	x	x	x
Public four-year, graduate	x	x	x	x
Private two-year	x	x	x	x
Private four-year, lower division	x	x	x	x
Private four-year, upper division	x	x	x	x
Private four-year, graduate	x	x	x	x
Non-collegiate	x	x	x	x

[a/] Code to indicate whether aid is a block grant, a capitation grant, or a per-student-aided grant.

(Table 14, continued)

(5) Additional Federal student grants (GF) and the maximum grant per student (A_G):

Year	Dollars of aid	Income cutoff	Maximum grant per student	Eligible Institutional categories
x	x	x	x	x, x, ...
x	x	x	x	x, x, ...
x	x	x	x	x, x, ...

(6) Additional state student grants (GS) and the maximum grant per student (A_G):

Year	Dollars of aid	Income cutoff	Maximum grant per student	Eligible Institutional categories
x	x	x	x	x, x, ...
x	x	x	x	x, x, ...
x	x	x	x	x, x, ...

(7) Additional Federal student loans (LF) and the maximum loan per student (A_L):

Year	Dollars of aid	Income cutoff	Maximum loan per student	Eligible Institutional categories
x	x	x	x	x, x, ...
x	x	x	x	x, x, ...
x	x	x	x	x, x, ...

(Table 14, continued)

(8) Additional state student loans (LS) and the maximum loan per student (A_L):

Year	Dollars of aid	Income cutoff	Maximum loan per student	Eligible Institutional categories
x	x	x	x	x, x, ...
x	x	x	x	x, x, ...
x	x	x	x	x, x, ...

(9) Additional Federal work-study grants (WF) and the maximum grant per student (A_W):

Year	Dollars of aid	Income cutoff	Maximum grant per student	Eligible Institutional categories
x	x	x	x	x, x, ...
x	x	x	x	x, x, ...
x	x	x	x	x, x, ...

(10) Additional state work-study grants (WS) and the maximum grant per student (A_W):

Year	Dollars of aid	Income cutoff	Maximum grant per student	Eligible Institutional categories
x	x	x	x	x, x, ...
x	x	x	x	x, x, ...
x	x	x	x	x, x, ...

(Table 14, continued)

(11) Additional Federal assistance to state governments (FST):

Year	Dollars of aid
x	x
x	x
x	x

(12) Additional Federal assistance to local governments (FLC):

Year	Dollars of aid
x	x
x	x
x	x

Table 15: Variable Definitions

(1) n^{b}_{im} = Baseline enrollment for institutional category i and income category m.

(2) n^{t}_{im} = Enrollment after a tuition change for institutional category i and income category m.

(3) n^{a}_{im} = Enrollment after the distribution of student aid from tuition revenues for institutional category i and income category m.

(4) n^{s}_{im} = Enrollment after the distribution of student aid from Federal and State sources for institutional category i and income category m.

(5) α_{ijm} = Percentage change in enrollment for institutional category i and income category m given a $1 per student grant decrease for institutional category j.

(6) β_{ijm} = Percentage change in enrollment for institutional category i and income category m given a $1 per student loan decrease for institutional category j.

(7) ℓ_{ijm} = Percentage change in enrollment for institutional category i and income category m given a $1 per student work-study decrease for institutional category j.

(8) G_{im} = Additional dollars per student of Federal and State grants for institutional category i and income category m.

(9) L_{im} = Additional dollars per student of Federal and State loans for institutional category i and income category m.

(10) W_{im} = Additional dollars per student of Federal and State work-study for institutional category i and income category m.

(Table 15, continued)

(11) TG_{im} = Additional dollars per student of aid from tuition revenues for institutional category i and income category m.

(12) SA_{im} = Additional dollars per student of aid from all sources for institutional category i and income category m.

(13) GF = Additional dollars of student grants from Federal sources.

(14) GS = Additional dollars of student grants from State sources.

(15) LF = Additional dollars of student loans from Federal sources.

(16) LS = Additional dollars of student loans from State sources.

(17) WF = Additional dollars of student work-study from Federal sources.

(18) WS = Additional dollars of student work-study from State sources.

(19) P_i = New tuition level for institutional category i.

(20) Y_m = Mid-point of family income category m.

(21) P_{max} = Maximum new tuition level over all institutional categories.

(22) Y_{min} = Minimum mid-point of family income categories.

(23) d_G = Proportionality constant for distributing grants over institutional categories and income categories.

(24) d_L = Proportionality constant for distributing loans over institutional categories and income categories.

(25) d_W = Proportionality constant for distributing work-study over institutional categories and income categories.

(26) K_G = Scaling factor for distributing grants over institutional categories and income categories.

(Table 15, continued)

(27) K_L = Scaling factor for distributing loans over institutional categories and income categories.

(28) K_W = Scaling factor for distributing work-study over institutional categories and income categories.

(29) A_G = Maximum dollars per student of grant aid to be allowed.

(30) A_L = Maximum dollars per student loan aid to be allowed.

(31) A_W = Maximum dollars per student of work-study aid to be allowed.

(32) TC_i = Tuition change (dollars) for institutional category i.

(33) PT_i = Proportion of additional tuition revenues to be redistributed as student aid.

(34) T_i = Baseline tuition level (dollars) for institutional category i.

(35) AR_i = Additional non-student-aid revenues for institutional category i.

(36) AE_i = Additional non-student-aid expenditures for institutional category i.

(37) AC_i = Baseline average cost per student for institutional category i.

(38) NP_i^o = Baseline net price per student for institutional category i.

(39) NP_i' = New net price per student for institutional category i.

(40) PF_i = Baseline proportion that Federal revenues are of total revenues for institutional category i.

(41) PS_i = Baseline proportion that State revenues are of total revenues for institutional category i.

(Table 15, continued)

(42) PL_i = Baseline proportion that local revenues are of total revenues for institutional category i.

(43) PP_i = Baseline proportion that private revenues are of total revenues for institutional category i.

(44) IF_i = Additional Federal revenues to institutional category i induced by enrollment changes.

(45) IS_i = Additional State revenues to institutional category i induced by enrollment changes.

(46) IL_i = Additional local revenues to institutional category i induced by enrollment changes.

(47) IP_i = Additional private revenues to institutional category i induced by enrollment changes.

(48) FI_i = Additional dollars of Federal institutional aid to institutional category i (either block, capitation, or per student aided).

(49) SI_i = Additional dollars of State institutional aid to institutional category i (either block, capitation, or per student aided).

(50) LI_i = Additional dollars of local institutional aid to institutional category i (either block, capitation, or per student aided).

(51) FST = Additional dollars of Federal assistance to State governments for postsecondary education.

(52) FLC = Additional dollars of Federal assistance to local governments for postsecondary education.

(53) TF = Total additional Federal revenues per additional student.

(54) TS = Total additional State revenues per additional student.

(Table 15, continued)

(55) TL = Total additional local revenues per additional student.
(56) TP = Total additional private revenues per additional student.

coefficients. Therefore, the only student aid explicitly considered was student grants, and equations 9, 10, 12, 13, 15, and 16 were not used in the policy evaluation. Also, equation 14 was not included in the model for the policy evaluations by the National Commission, and therefore, it was not possible to specify an exact limit to the size of student aid grants. However, it was possible to have the program output the student aid distribution by institutional category and family income category. The National Commission staff did this for several of the policy alternatives to ensure that the maximum was less than $1,400. This documentation of the model includes all these omitted equations since the model will soon be implemented with these additional equations.

3. Model Equations

The system of equations forming the Commission's model follows the logic described previously and can be outlined in the following steps. The equations needed for the calculations in each step use the notation for the variables already discussed. Although the model can be run for any three years between 1974 and 1985, for simplicity of exposition none of the variables in the equations have a subscript for time. All of the equations were solved separately for each year of interest.

Step 1: Calculate the enrollment resulting from the new tuition levels.

$$[1] \quad TC_i = P_i - T_i \qquad i = 1, \ldots, 9$$

(tuition changes)

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$$[2] \quad n_{im}^{t} = n_{im}^{b} \left(1 + \sum_{j=1}^{9} a_{ijm} \, TC_j\right) \qquad \begin{matrix} i = 1,\ldots, 9 \\ m = 1,\ldots, 11 \end{matrix}$$

(enrollments after the tuition changes)

Step 2: Calculate the enrollment after the distribution of student aid from additional tuition revenues. If $TC_i \leq 0$, this step is omitted for that institutional category (i).

$$[3] \quad n_{im}^{a} = n_{im}^{t} \left(1 - \sum_{j=1}^{9} a_{ijm} \, TG_{jm}\right) \qquad \begin{matrix} i = 1,\ldots, 9 \\ m = 1,\ldots, 11 \end{matrix}$$

(enrollments after the distribution of student aid grants from additional tuition revenues)

$$[4] \quad \sum_{m=1}^{11} n_{im}^{a} \, TG_{im} = \sum_{m=1}^{11} n_{im}^{a} \, TC_i PT_i \qquad i = 1,\ldots, 9$$

(expenditures for grants = revenues from increased tuition for grants)

$$[5] \quad TG_{im} = d_G \left(\frac{P_i}{Y_m} + k_G P_i\right) \qquad \begin{matrix} i = 1,\ldots, 9 \\ m = 1,\ldots, IC \end{matrix}$$

(financial need formula where IC is the maximum income category cutoff level for aid eligibility)

$$[6] \quad d_G \left(\frac{P_i}{Y_{min}} + k_G P_i\right) = A_G \qquad i = 1,\ldots, 9$$

(specification of maximum grant per student)

Step 3: Calculate the enrollment after the distribution of student aid from Federal and state sources. Note that J represents the set of institutional categories eligible for the student aid programs.

$$[7]\quad n^{s}_{im} = n^{a}_{im}\left(1 - \sum_{j\epsilon J} \alpha_{ijm}\, G_{jm} - \sum_{j\epsilon J} \beta_{ijm}\, L_{jm} - \sum_{j\epsilon J} \ell_{ijm}\, W_{jm}\right) \qquad \begin{matrix} i \in J \\ m = 1,\ldots, IC \end{matrix}$$

(enrollments after the distribution of Federal and state grants, loans, and work study)

$$[8]\quad \sum_{m=1}^{IC} \sum_{i\epsilon J} n^{s}_{im}\, G_{im} = GF + GS$$

(expenditures for grants = Federal and state appropriations for grants)

$$[9]\quad \sum_{m=1}^{IC} \sum_{i\epsilon J} n^{s}_{im}\, L_{im} = LF + LS$$

(expenditures for loans = Federal and state appropriations for loans)

$$[10]\quad \sum_{m=1}^{IC} \sum_{i\epsilon J} n^{s}_{im}\, W_{im} = WF + WS$$

(expenditures for work study = Federal and state appropriations for work study)

$$[11]\quad G_{im} = d_G\left(\frac{P_i}{Y_m} + k_G P_i\right) \qquad \begin{matrix} i\epsilon J \\ m = 1,\ldots, IC \end{matrix}$$

(financial need formula for grants)

$$[12]\quad L_{im} = d_L\left(\frac{P_i}{Y_m} + k_L P_i\right) \qquad \begin{matrix} i\epsilon J \\ m = 1,\ldots, IC \end{matrix}$$

(financial need formula for loans)

$$[13]\quad W_{im} = d_W\left(\frac{P_i}{Y_m} + k_W P_i\right) \qquad \begin{matrix} i\epsilon J \\ m = 1,\ldots, IC \end{matrix}$$

(financial need formula for work study)

$$[14] \quad d_G \left(\frac{P_{max}}{Y_{min}} + k_G P_{max} \right) = A_G$$

(specification of maximum grant per student)

$$[15] \quad d_L \left(\frac{P_{max}}{Y_{min}} + k_L P_{max} \right) = A_L$$

(specification of maximum loan per student)

$$[16] \quad d_w \left(\frac{P_{max}}{Y_{min}} + k_w P_{max} \right) = A_w$$

(specification of maximum work study support per student)

Note that if several "packages" of student aid are included in one policy proposal, equations 7-16 would have to be solved for each package with IC, J, GF, GS, LF, LS, WF, WS, A_G, A_L, and A_W specified appropriately for each aid package.

Step 4: Calculate the institutional revenue needs from Federal, state, local, and private sources induced by the enrollment changes.

$$[17] \quad AR_i = \sum_{m=1}^{11} T_i \left(n^s_{im} - n^b_{im} \right) + \sum_{m=1}^{11} TC_i \, n^s_{im} \left(1 - PT_i\right)$$

$$i = 1, \ldots, 9$$

(additional institutional revenues resulting from tuition and enrollment changes)

$$[18] \quad AE_i = \sum_{m=1}^{11} AC_i \; (n^s_{im} - n^b_{im}) \qquad i = 1, \ldots, 9$$

(additional institutional expenditures resulting from enrollment changes)

$$[19] \quad IF_i = (AE_i - AR_i) \, PF_i \qquad i = 1, \ldots, 9$$

(induced changes in institutional expenditures to be borne by the Federal government)

$$[20] \quad IS_i = (AE_i - AR_i) \, PS_i \qquad i = 1, \ldots, 9$$

(induced changes in institutional expenditures to be borne by state governments)

$$[21] \quad IL_i = (AE_i - AR_i) \, PL_i \qquad i = 1, \ldots, 9$$

(induced changes in institutional expenditures to be borne by local governments)

$$[22] \quad IP_i = (AE_i - AR_i) \, PP_i \qquad i = 1, \ldots, 9$$

(induced changes in institutional expenditures to be borne by private sources)

Step 5: Calculate the total additional dollars per additional student from Federal, state, local, and private sources resulting from the proposed financing policy.

$$[23] \quad TF = (GF + LF + WF + FST + FLC + \sum_{i=1}^{9} NF_i) / \left(\sum_{m=1}^{11} \sum_{n=1}^{9} n^s_{im} - n^b_{im} \right)$$

(total additional Federal dollars per additional student)

where $NF_i = \max (FI^*_i , IF_i)$ if $\text{sgn} (FI^*_i) = \text{sgn} (IF_i)$

$= FI^*_i + IF_i$ if $\text{sgn} (FI^*_i) \neq \text{sgn} (IF_i)$

and $FI^*_i = FI_i$ if block grant

$= FI_i \sum_{m=1}^{11} n^s_{im}$ if capitation grant

$= FI_i \sum_{m=1}^{11} (n^s_{im} - n^b_{im})$ if per-student-aided grant and $(n^s_{im} - n^b_{im}) > 0$

$= 0$ if per-student-aided grant and $(n^s_{im} - n^b_{im}) < 0$

$$[24]\quad TS = (GS + LS + WS - FST + \sum_{i=1}^{9} NS_i) \Big/ \left(\sum_{m=1}^{11} \sum_{i=1}^{9} n^s_{im} - n^b_{im} \right)$$

(total additional state dollars per additional student)

where NS_i is defined similarly to NF_i and SI_i^* to FI_i^*

$$[25]\quad TL = (-FLC + \sum_{i=1}^{9} NL_i) \Big/ \left(\sum_{m=1}^{11} \sum_{i=1}^{9} n^s_{im} - n^b_{im} \right)$$

(total additional local dollars per additional student)

where NL_i is defined similarly to NF_i and LI_i^* to FI_i^*

$$[26]\quad TP = \sum_{i=1}^{9} IP_i \Big/ \left(\sum_{m=1}^{11} \sum_{i=1}^{9} n^s_{im} - n^b_{im} \right)$$

(total additional dollars per additional student from private sources)

where NP_i is defined similarly to NF_i and PI_i^* to FI_i^*

Step 6: Calculate the new net price per student

$$[27]\quad SA_{im} = G_{im} + L_{im} + W_{im} + TG_{im} \qquad \begin{matrix} i = 1,\ldots, 9 \\ m = 1,\ldots, 11 \end{matrix}$$

(total additional student aid per student)

$$[28] \quad NP_i' = NP_i^o + TC_i - [(\sum_{m=1}^{11} n_{im}^s \; SA_{im}) / \sum_{m=1}^{11} n_{im}^s] \qquad i = 1, \ldots, 9$$

(new net price per student resulting from the proposed financing policy)

4. Assumptions of the Model

Sequence of Calculations

Once all of the mathematical interrelationships are identified, obtaining a mathematical solution is complex, because it involves a large set of nonlinear and simultaneous equations. Although these equations could be solved directly, we chose to break the solution into three sequential steps; within each step, the equations are solved simultaneously. Breaking the solution into steps was done to greatly simplify the complexity of the mathematics--allowing a simpler, more economical computer program.

Although we are not trying to simulate the separate student finance-related decisions of institutions to set tuitions, then to package the student aid from institutional sources, and then to incorporate outside student aid, the chain of calculations proceeded in this order. Unlike the National Planning Model, the Commission's model does not calculate any response of institutions to modify their tuition rates in light of student demand, external financial support of either students or institutions, or any other factors. Incorporating this feedback-response would require an explicit statement of institutional objectives and solving the decision problems for each relatively

homogeneous type of institution.

Price Response Coefficients

The study of the behavioral response of individuals to changes in tuition, student aid of various types, and other factors related to postsecondary education is relatively recent and still largely incomplete. Personal experiences and casual empiricism suggest that the ever increasing costs of college attendance discourage some individuals from attending postsecondary education. Several statistical studies based on time-series, cross-sectional, and longitudinal data collected during the 1960s support this intuition. (See Appendix A for a discussion of these studies.) The price response coefficients used by the model to obtain the results presented in this paper were calculated by Miller and Radner[5] based on longitudinal data collected on a sample of high school students in four states beginning in 1960. In our view, the Miller-Radner formulation and estimations were, of all the studies available, the most consistent with the structure and definition of the model. As additional student demand studies are completed, their results can probably be incorporated in the model as it is currently conceived.

It is interesting to consider for a moment the implication that there is no price responsiveness behind individual decisions to attend postsecondary education. In fact, all of the financing analyses by the Carnegie Commission and the Committee for Economic Development were based on the assumption that there would be no price responsiveness to their recommended doubling or quadrupling of tuitions at public institutions. To be consistent, one would then have to assume that increased student aid, which lowers the price of attending postsecondary education, would also have no effect on individual decisions to attend postsecondary education. Here, both the Carnegie Commission and the CED contradicted their previous assumption and advocated massive

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[5] L. Miller and R. Radner, "Demand for Places: Summary of Results," op. cit., 1974.

increases in student aid to increase access to postsecondary education. Neither group dealt with this logical inconsistency.

The authors of this report believe that our quantitative analyses should be consistent with logic and with the available evidence--both of which indicate that individuals of all income levels respond negatively to an increase in the cost of attendance and that low-income individuals demonstrate more responsiveness than high-income individuals. Therefore, the policy analyses described in Chapter 4 of this report assumed a non-zero price responsiveness at all income levels.

Current evidence is very sketchy on many points about student responses to price--including the differential effects of, for example, a $100 decrease in tuition, a $100 increase in a student's grant, a $100 increase in a student's work income, or a $100 increase in a student's loan. The quantitative results discussed in this report assume that equal changes in tuition and in a student's grant have equal and opposite effects on individual attendance decisions. One could argue against this assumption on several grounds: (a) tuition is a certain price known somewhat in advance of application for admission while student grant awards are uncertain and unknown until after a student has applied for admission; (b) tuition changes are very visible publicly and, therefore, less likely to occur capriciously while student grant awards are subject to constant renegotiation by funders and financial aid officers without comparable public visibility; (c) decreased tuition creates a free-good mentality leading many individuals with only marginal interest to attend postsecondary education while student grants have some symbolism of specialness (awarded on the basis of need, ability or whatever), and this sense of specialness motivates individuals more than an equivalent general price decrease hinders them. Without enough information to resolve any of these points, we, in essence, adopted the null hypothesis--namely, the assumption that equal changes in tuition and a student's grant would have equal and opposite effects on individual attendance decisions.

Although National Direct Student Loans (NDSL, formerly titled National Defense Student Loans) have been available in considerable quantity for over 15 years and student work-derived income has probably always been important to college attendance choices, we know of no statistical evidence of the relative impacts of these two delivery mechanisms or of their cross effects on the impacts of tuition and student grants. Consequently, the quantitative results discussed in this report deal with student grants and not with student work or loans. The computer program for the model was written to include the provision of work and loans as part of the total student aid package; but we had no empirical basis for incorporating them at this time.

The Miller-Radner demand study uses a logit formulation which yields meaningful results for a broad range of tuitions. The analysis of marginal changes in tuition was based on the (linear) tangent to the logit function evaluated at current tuitions. This means that more-than-marginal changes should be evaluated by going back to the logit function rather than using the linear tangent. Again, for simplicity, we chose to focus primarily on marginal changes for which the linear assumption would be reasonable. At the request of the Commission, we included one extreme case of full cost pricing in public institutions, in which the tuition changes are clearly more than marginal; the results for this case should be interpreted cautiously.

Financial Need Basis for Student Aid Distribution

Most of the direct student aid in the United States is not distributed on the basis of financial need. Veterans' benefits and Social Security survivors' benefits, which constitute over one-half of total student aid, are independent of personal financial need. Virtually all indirect student aid (for example, low tuitions in public institutions) is distributed independent of financial need. However, our philosophy of analyzing marginal changes led us to examine financial need-based distribution of student aid because

the bulk of newly authorized student aid--Basic Educational Opportunity Grants, Supplemental Educational Opportunity Grants, and the revised Guaranteed Student Loan Program--focuses on a student's financial need.

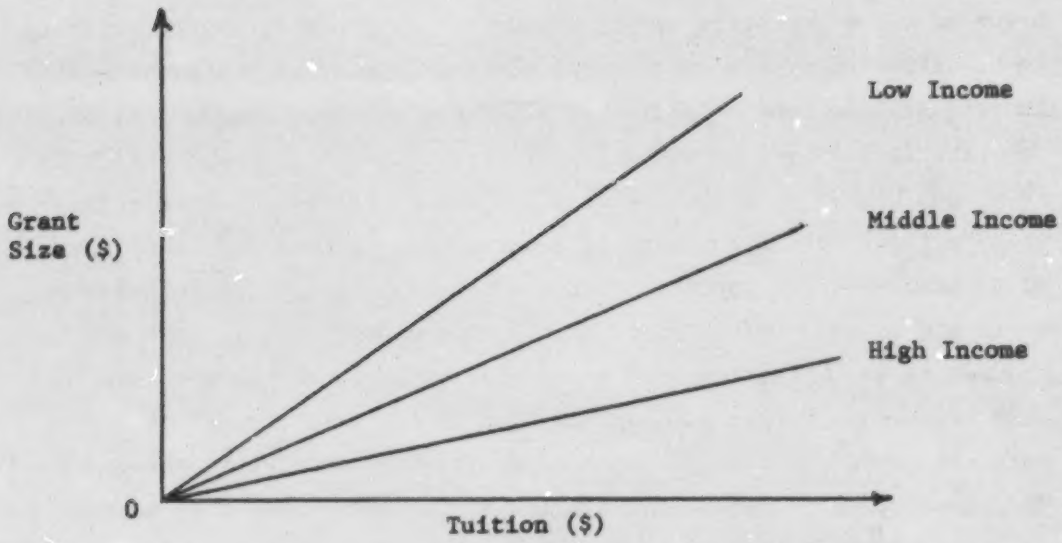
The procedures for calculating a student's financial need vary somewhat among the various federal and state programs; however, two common considerations are the cost of attendance and parental income and assets. We chose to approximate the needs criteria in two ways. First, we used tuition to represent cost of attendance and parental income to represent parental income and assets. (In making this representation, we did not argue that these proxies are equal to the cost of attendance and the combination of parental income and assets, but that, because the proxies are highly correlated to the larger quantities, it is appropriate for marginal analysis to be proportional to these proxies.) Second, we used a formula to represent the general pattern of financial needs analysis (see Figure A), averaging out family size, different treatment of farm/nonfarm assets, and other distinctions.

It is important to observe that as used by the model, the term "income" could just as well be student income as parental income. The results discussed in this report were based on parental income data because that is the current structure of financial needs analysis. The same formula-pattern now utilized by the model could be used in that case as well.

Institutional Cost Behavior

With the current technology for cost analysis, it is virtually impossible to determine the cost of marginal enrollment changes in institutions of postsecondary education. On the one hand, one could argue that most institutions could experience a 2-5 percent change in enrollment without the need for (or saving of) additional resources; and that 20 to 50 students can effectively "melt" into a campus of

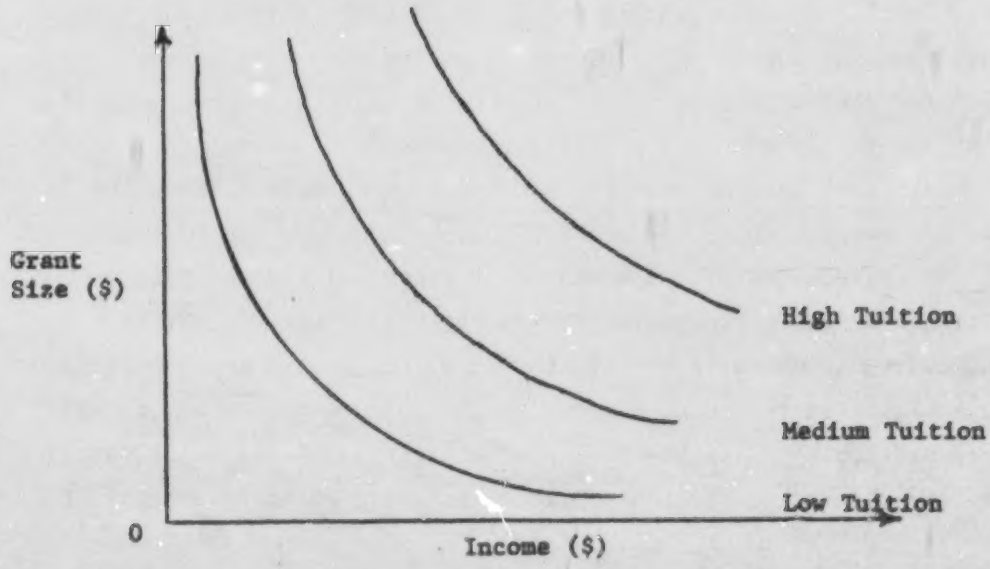
Figure A: Student Aid Grant Size as a Function of Tuition and Income



Student Aid Distribution Was Based on the Formula:

$$\text{Grant} = d\left(\frac{\text{tuition}}{\text{income}} + k\ \text{tuition}\right)$$

k is a constant
d is determined within the model



1,000 students without requiring more faculty, more library volumes, or more staff in the registrar's office. On the other hand, one could argue that the particular types of additional students that are likely to be attracted by expanded recruitment and financial aid efforts are individuals who need considerable remedial training, counseling, child day care facilities, or other social services--all of which will result in a much higher cost than average for the institution. Once again, we have insufficient evidence to resolve this dilemma and, once again, we adopted a null hypothesis that the marginal cost to an institution of an additional student would be the same as the average cost per student at that institutional type. Intuitively, we believe that this is a very conservative assumption, that it probably overestimates the marginal costs (or savings) induced by marginal changes in enrollment. This assumption is particularly relevant in considering the institutional supplements calculated in the next chapter.

Sharing Financial Responsibility

Institutions of postsecondary education are now financed by many sources--federal, state and local governments, students and their families, private donors, and an institution's own resources. But the question is how will any changes from currently anticipated financial support be divided among the various sources? As discussed in an earlier section of this report, the model first calculated the change in costs and the change in revenues associated with a given set of tuition and student aid policies. Any unmet costs were then matched against any policy changes in institutional support, and any still unmet costs were then assumed to be borne by the various financing sources in proportion to the share they now pay.

The calculation of the division of financial responsibility resulting from any given policy option is complex because the indirect or induced costs borne by institutions and individuals must be calculated in addition to the direct changes in support policies. It would be very difficult to specify an ultimate division of financial responsibility and then calculate the implicit financing policies because of

the multiple interactions. Bear in mind that this is still assuming no feedback among financing sources, the realistic modeling of which becomes even more complex (see the National Planning Model).

Sensitivity to Data Changes

Although this topic is usually not listed as an assumption, sensitivity to data changes is discussed here because the lack of time prevented the staff from executing extensive sensitive analyses. The results of using the model are presented with the underlying assumption that reasonable changes in the data would not change the general structure of the results. Three different sets of price response coefficients were used at different times, for instance, and they did not change the ordering of the results. At least two completely different enrollment forecasts were evaluated with similar results. The projected baseline financing figures are only for benchmarks; they are not used in the model's calculations. Over fifty different policy configurations were developed to test all aspects of the model and the results were both internally consistent and logical. However, a thorough sensitivity analysis could be very useful before users either base their policies on the results they winnow from the model or initiate new data collection efforts.

Role of Judgment

The role of judgment is another topic rarely discussed as an assumption. However, the often believed--though completely false--assumption that analytical models replace human judgment necessitates a vigorous assertion of the contrary, and we believe correct, assumption: namely, the principle contribution of quantitative analysis is to extend the judgment of decision makers.

The best judgment of an analyst is used at every stage of the construction of an analytical model: in the choice of a particular formulation, in the choice of data, and in the structuring of policy questions to which the model responds. There are many checks on analytical judgments: the constant peer review within and outside

of the research staff; empirical studies conducted by scholars in many different settings across the country; rederiving the necessary mathematics from several different perspectives; and sensitivity analysis. To some degree, we employed all of these touchstones to attempt to insure that the basic analytical judgments were reasonable. This report itself is another attempt to facilitate outside review and comment.

The best judgments of policy makers are needed to identify important policy questions and to frame realistic alternatives. The purpose of analysis is then to provide more information on the likely consequences of alternative policies--information that is at times counter-intuitive and, therefore, potentially significant in changing decisions. More information does not necessarily mean easier decisions; very often more information complicates decisions, unsettles prior notions, removes simplistic rationales, or favors alternatives eschewed by the policy maker seeking the information. More information does not mean less judgment; it frequently necessitates more judgment. Policy analysis does not constrain judgment; it is intended to extend or amplify judgment.

Conclusion

In this chapter, we have described the analytical model, which is just one part of the analytical framework developed by the Commission. The purpose of this chapter has been to describe the details of the model, the variables and equations used, the assumptions employed, and the rationale for each. Appendix E is a detailed guide for potential users of the Commission's model--including computer hardware and software specifications and a sample run of the model. The complete listings of the model's FORTRAN computer programs are presented in Appendix F. The next chapter of the text illustrates the application of the model to the financing alternatives considered by the Commission.

4. APPLYING THE ANALYTICAL MODEL IN THE ANALYSIS OF ALTERNATIVE FINANCING PLANS

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CHAPTER 4.

APPLYING THE ANALYTICAL MODEL IN THE ANALYSIS OF ALTERNATIVE FINANCING PLANS

In the course of its analytical work, the Commission studied several dozen alternative plans for the financing of postsecondary education. From these, it selected eight to be described and analyzed in its final report. These eight were selected on the basis of two requirements. The first requirement was that they should represent a range of policy choices extending from (a) plans that would allocate nearly all public support to institutions to (b) plans that would allocate nearly all public support to the students. The second requirement was that the plans should represent a range of judgments about who benefits from education. At one extreme, on the assumption that the individual is the primary beneficiary of his or her education, were plans that require students (and their families) to bear all or nearly all the cost of instruction. At the other extreme, on the assumption that society is the primary beneficiary of an educated citizenry, were plans that, by eliminating tuition at public institutions, fully financed the cost of instruction from public revenues.

Although this chapter describes only eight alternative plans, the Commission's staff, in consultation with members of the Commission and others, used the analytical model to examine in detail more than fifty possible alternatives. From among these many alternatives, eight were selected that, in the opinion of the Commission, best exemplified the ranges described above.

One of the alternatives (Plan A) proposes a major shift in the responsibility for financing instructional expenditures in the public collegiate sector from public and private sources to students and their parents. A second alternative (Plan F) proposes a major shift in the other direction, transferring responsibility for financing instructional expenditures in the public collegiate sector from lower-division students and their parents to public sources. A third alternative (Plan B) proposes a substantial reduction in the public sector in current institutional

aid and a corresponding increase in student aid. Two other plans (Plans G and F) would increase the current amounts of institutional aid and reduce student aid. Each of the other alternatives (Plans C, D, E, and H) contain various mixtures of institutional and student support policies falling between these extremes. Four plans (C, D, F, and H) provide additional student aid to individuals attending private collegiate institutions.

Although readers are cautioned that none of the eight alternatives is an exact duplicate of a proposal advanced by a specific organization or individual, several of the alternatives contain features prominent in financing plans advanced by national organizations or by individuals. In each case, the alternative is intended to serve as an example of a national policy choice with respect to the support of postsecondary education.

In arraying and analyzing these various alternative financing plans (see section 1 below), the Commission neither advocated a particular alternative nor suggested that these eight alternatives should be preferred over the many other alternatives that might have been analyzed. Rather, the Commission described and analyzed these plans for the purpose of evaluating and demonstrating the usefulness of the analytical framework.

Each of these plans is examined from two different perspectives. In the second section, each plan is described and analyzed in terms of the impact it would have on objectives at the level of financing recommended for each plan. Then in the third section, the same eight plans are again analyzed, but at a level of financing common to all of them. The different impacts of the several plans on the objectives of access and choice are analyzed at this common level of financing. In the last section of this chapter, generalizations about financing postsecondary education--especially those that are of particular significance to the evaluation of financing policies and plans--are drawn.

1. Arraying the Impact Data

After all of the steps of the analytical model were completed for each of the eight alternative financing plans, the Commission arrayed the data--arranging the numbers, sometimes in absolutes, sometimes in percentages--to show the estimated impacts that the alternative financing plans would have on certain postsecondary educational objectives. In the following sections, there are three kinds of tables arraying the estimates produced by the analytical model. There are (1) tables containing enrollment and financial figures for the plans at levels of financing recommended for the plans (Tables 16 and 17); (2) tables containing enrollment and financial figures for the plans at a level of financing common to all of them (Tables 19 and 20 in a later section of this chapter); and (3) a table comparing actual enrollments for 1972 with enrollments for 1980 as projected by the model in evaluating the alternatives at the level of financing recommended for each plan (Table 18).

Throughout the descriptions of the alternative financing plans (in Sections 2 and 3 of this chapter, and in the left-hand columns of Tables 16, 17, 19, and 20) are figures that extrapolate to 1977 or 1980 the 1972 financing patterns, levels, and trends described in Chapter 3 of Financing Postsecondary Education in the United States. These extrapolated figures are based on the assumption that the 1972 patterns of financing and enrollment* will continue through 1980. These extrapolations are used as reference points against which the impacts of the alternative financing plans on objectives are measured.

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*The extrapolated figures for enrollments assume that the 1973 enrollment projections of the National Center for Educational Statistics for the collegiate sector (which were based on actual enrollments in 1972) will hold for 1977 and 1980. The extrapolated figures also assume that noncollegiate enrollments will increase at the same rate as the general population.

Data in Tables 16, 17, 19, and 20 tell the estimated percentage or absolute increase or decrease from the extrapolated 1972 patterns of financing and enrollments if an alternative financing plan were implemented. These kinds of data on Tables 16, 17, 19, and 20 allow for comparisons of individual plans with the extrapolated 1972 patterns of financing and enrollments for 1977 and 1980. That is, the anticipated financing and enrollment impacts of each of the plans in 1977 and 1980 are compared with the extrapolated data for the same years. Table 18, on the other hand, compares actual 1972 enrollments with the enrollment figures projected by each of the plans in 1980--to show the different enrollment trends that would result by the implementation of each alternative plan. The data arrayed on these tables are intended to aid the reader in evaluating the eight alternative plans discussed in the second and third sections of this chapter.

Tables 16, 17, 19, and 20 present two kinds of information: the major policy decisions contained in each plan (Parts I and II) and the projected results of these decisions in terms of enrollments and financing patterns (Parts III, IV, and V). Parts I and II include policy decisions in terms of federal and state student aid; federal, state, and local institutional aid; federal aid through the states (intergovernmental transfers); and average tuitions by student level and sector. These policy decisions are expressed as incremental changes--increases or decreases from the extrapolated 1972 financing patterns and enrollments. These decisions are put into the analytical model and the results are shown in Parts III, IV, and V in terms of dollars and enrollment.

Part III, the projected cost by source, presents changes in the shared responsibility for financing that would result from proposed policy changes. This part of Tables 16, 17, 19, and 20 presents the financial responsibility that would be borne by federal, state, and local governments as well as students and their families (from tuition and fees). In addition, the incremental dollars required from the institutions' own funds, from such sources as gifts, endowment income, and auxiliary enterprises, are included.

Table 16: Estimated Changes in Cost, Tuition, and Enrollment Resulting from Alternative Financing Plans Based on Proposed Financing, Fiscal 1977

Extrapolated 1972 Financing Figures		Increases or Decreases from Current Financing Projection							
		Plan A	Plan B	Plan C	Plan D	Plan E	Plan F	Plan G	Plan H
	I. PROPOSED PUBLIC FINANCING POLICIES[1]								
	Student Aid:								
$6,541,600,000	Federal	$900,000,000	$740,599,808	$1,200,000,000	$1,221,425,920	$1,050,000,000	-$1,261,749,760	$0	$1,600,000,000
723,000,000	State	180,000,000	1,798,999,810	100,000,000	386,880,000	0	396,899,840	0	100,000,000
	Institutional Aid:[2]								
4,762,000,000	Federal	0	-740,599,808	0	16,666,768	0	1,[illegible]87,737,860	98*	400
12,508,000,000	State and Local	400*	-1,584,999,420	1,365,163,260	0	170*	0	0	150,000,000
0	Federal Aid Through States[3]	0	0	50,000,000	386,880,000	0	396,899,840	0	50,000,000
	II. AVERAGE TUITION (Before Student Aid)								
$192	Public Two-Year	$1,847	$123	$218	$0	$0	-$192	$0	$0
583	Public Four-Year, Lower Division	1,456	75	-175	0	0	-583	0	0
583	Public Four-Year, Upper Division	1,456	75	52	50	57	0	0	0
583	Public Four-Year, Graduate	1,456	75	647	100	57	0	0	0
2,039	Private, Undergraduate	0	0	0	0	0	0	0	0
2,039	Private, Graduate	0	0	0	0	0	0	0	0
1,526	Noncollegiate	0	0	0	0	0	0	0	0
	III. PROJECTED COST BY SOURCE								
$11,403,500,000	Federal	$378,788,864	$1,217,280	$1,219,404,800	$1,386,669,310	$1,055,309,440	$318,248,704	$852,553,472	$3,508,513,280
13,231,000,000	State and Local	-5,449,136,674	21,169,744	1,711,792,115	466,926,713	634,503,314	226,742,457	0	247,099,018
10,064,100,000	Institutional Funds[4]	493,392	151,021,216	72,240,352	144,902,160	47,010,240	33,172,928	0	105,223,296
8,219,000,000	Students and Family	-149,282,720	559,728,896	298,797,568	412,524,544	242,149,296	80,165,024	0	388,719,616
$42,917,600,000	Total Costs	-$5,219,127,300	$733,136,896	$3,302,234,370	$2,411,022,590	$1,978,971,900	$658,328,576	$852,553,472	$4,249,554,690

[1] All additional student and institutional aid figures are based on a maximum eligible family income of $15,000, except Plan D model, which has an eligibility ceiling of $18,000.

[2] Consists of block grants, capitation grants, or dollars per student aided.

[3] The money the federal government would give state or local governments to be distributed for postsecondary education.

[4] Includes such funds as income from gifts, endowments, and auxiliary enterprises.

* Dollars per student.

Table 16 (continued)

Extrapolated 1972 Financing Figures		Increases or Decreases from Current Financing Projection							
		Plan A	Plan B	Plan C	Plan D	Plan E	Plan F	Plan G	Plan H
	IV. PROJECTED ENROLLMENT								
1,990,000	Public Two-Year	-483,172	-51,740	1,990	-30,248	-16,915	-32,835	0	-22,686
1,856,800	Public Four-Year, Lower Division	-303,586	11,140	40,478	-1,671	11,326	-62,945	0	15,226
1,666,480	Public Four-Year, Upper Division	-324,963	34,662	16,998	26,497	20,331	0	0	32,830
1,118,720	Public Four-Year, Graduate	-215,801	11,075	11,187	6,265	4,475	0	0	0
6,632,000	Total, Public Institutions	-1,327,522	5,137	70,653	843	19,217	-95,780	0	25,370
1,515,695	Private, Undergraduate	101,248	163,088	147,022	153,843	59,567	69,115	0	108,069
566,305	Private, Graduate	12,062	622	25,143	-283	-227	0	0	0
2,082,000	Total, Private Institutions	113,310	163,710	172,165	153,560	59,340	69,115	0	108,069
1,732,000	Noncollegiate	144,795	146,527	44,166	53,172	72,851	-20,264	0	98,551
10,446,000	Total Enrollment	-1,069,417	315,374	286,984	207,575	150,408	46,929	0	231,990
	Undergraduate Enrollment by Family Income:								
3,344,117	Less than $10,000	-458,144	297,292	208,338	184,586	137,169	-77,918	0	211,683
2,615,557	$10,000 to $14,999	-233,308	36,417	36,196	20,924	15,432	9,416	0	27,202
2,898,301	$15,000 and over	-167,812	-9,564	-2,608	4,058	-2,319	26,375	0	0
	V. PROJECTED COST PER ADDITIONAL STUDENT (RATIO OF INCREMENTAL COST TO INCREMENTAL ENROLLMENT)								
	Federal Government	--	$2	$2,667	$3,465	$3,104	--	--	$7,789
	State and Local Governments	--	35	3,743	1,167	2,682	--	--	548
	Student and Family	--	931	653	1,031	831	--	--	863
	Private Sources	--	251	158	352	161	--	--	234
	Total Cost Per Additional Student	--	$1,219	$7,222	$6,025	$6,791	--	--	$9,434

Table 17: Estimated Changes in Cost, Tuition, and Enrollment Resulting from Alternative Financing Plans Based on Proposed Financing, Fiscal 1980

Extrapolated 1972 Financing Figures		Increases or Decreases from Current Financing Projection							
		Plan A	Plan B	Plan C	Plan D	Plan E	Plan F	Plan G	Plan H
	I. PROPOSED PUBLIC FINANCING POLICIES[1]								
	Student Aid:								
$7,746,900,000	Federal	$1,200,000,000	$876,999,536	$1,500,000,000	$1,628,600,060	$1,250,000,128	-$1,681,344,000	$0	$1,800,000,000
827,000,000	State	240,000,000	2,129,999,870	110,000,000	385,280,128	0	485,600,600	0	100,000,000
	Institutional Aid:[2]								
5,212,000,000	Federal	0	-876,999,680	0	16,666,762	0	1,942,403,840	98*	400
14,671,300,000	State and Local	600*	-1,876,499,200	1,600,447,490.	0	170*	0	0	150,000,000
0	Federal Aid Through States[3]	0	0	55,000,000	385,280,128	0	485,600,000	0	50,000,000
	II. AVERAGE TUITION (Before Student Aid)								
$228	Public Two-Year	$2,187	$858	$347	$0	$0	-$228	$0	$0
691	Public Four-Year, Lower Division	1,724	516	-116	0	0	-691	0	0
691	Public Four-Year, Upper Division	1,724	516	171	59	92	0	0	0
691	Public Four-Year, Graduate	1,724	516	1,034	100	162	0	0	0
2,415	Private, Undergraduate	0	0	0	0	0	0	0	0
2,415	Private, Graduate	0	0	0	0	0	0	0	0
1,570	Noncollegiate	0	0	0	0	0	0	0	0
	III. PROJECTED COST BY SOURCE								
$13,058,900,000	Federal	$583,622,912	-$114,112,768	$1,525,558,020	$1,796,269,570	$1,261,371,648	$247,219,968	$873,924,096	$3,780,706,300
15,498,300,000	State and Local	-5,544,197,772	-2,211,351,612	2,005,515,467	510,760,135	748,305,679	192,831,781	0	262,617,036
12,126,100,000	Institutional Funds[4]	40,766,704	153,581,024	89,687,920	200,239,584	77,643,536	46,624,608	0	135,977,920
9,733,700,000	Students and Family	-181,318,912	559,310,848	389,079,020	593,408,768	348,358,144	103,758,768	0	508,569,344
$50,417,000,000	Total Costs	-$5,101,117,440	-$1,612,572,420	$4,009,840,130	$3,100,677,630	$2,435,678,980	$590,434,816	$873,924,096	$4,687,863,810

[1]All additional student and institutional aid figures are based on a maximum eligible family income of $15,000, except Plan B model, which has an eligibility ceiling of $10,000.

[2]Consists of block grants, capitation grants, or dollars per student aided.

[3]The money the federal government would give state or local governments to be distributed for postsecondary education.

[4]Includes such funds as income from gifts, endowments, and auxiliary enterprises.

*Dollars per student.

Table 17 (continued)

Extrapolated 1972 Financing Figures		Increases or Decreases from Current Financing Projection							
		Plan A	Plan B	Plan C	Plan D	Plan E	Plan F	Plan G	Plan H
	IV. PROJECTED ENROLLMENT								
2,138,000	Public Two-Year	-616,172	-168,902	37,843	-36,774	-18,600	-44,470	0	-36,084
1,894,000	Public Four-Year, Lower Division	-365,731	-67,237	26,137	1,326	11,932	-93,165	0	16,067
1,699,865	Public Four-Year, Upper Division	-393,179	-52,696	60,005	33,827	35,357	0	0	35,607
1,114,135	Public Four-Year, Graduate	-254,580	-76,207	5,014	6,230	11,030	0	0	0
6,846,000	Total, Public Institutions	-1,629,662	-365,042	128,999	4,618	39,719	-137,655	0	26,280
1,647,730	Private, Undergraduate	137,091	185,534	90,955	188,500	78,432	88,813	0	125,557
578,270	Private, Graduate	41,498	4,395	-3,007	-347	-578	0	0	0
2,226,000	Total, Private Institutions	178,779	189,929	87,948	188,153	77,854	88,813	0	125,557
1,838,000	Noncollegiate	186,373	174,978	66,903	75,542	70,218	-22,975	0	111,567
10,910,000	Total Enrollment	-1,264,510	-135	283,850	268,313	196,791	-71,817	0	263,404
	Undergraduate Enrollment by Family Income:								
3,487,073	Less than $10,000	-558,978	175,400	271,992	230,844	170,867	-112,632	0	233,634
2,725,971	$10,000 to $14,999	-285,954	-41,435	25,079	26,169	18,809	8,723	0	29,713
3,004,551	$15,000 and over	-206,713	-61,894	-15,323	5,408	-3,605	31,848	0	0
	V. PROJECTED COST PER ADDITIONAL STUDENT (RATIO OF INCREMENTAL COST TO INCREMENTAL ENROLLMENT)								
	Federal Government	--	-$651	$2,743	$3,597	$2,683	--	--	$7,605
	State and Local Governments	--	-12,617	3,606	1,023	2,783	--	--	529
	Student and Family	--	3,191	700	1,188	948	--	--	1,023
	Private Sources	--	876	161	401	211	--	--	274
	Total Cost Per Additional Student	--	-$9,201	$7,211	$6,210	$6,625	--	--	$9,430

Table 18: Absolute and Percentage Increase or Decrease in Projected Enrollment from 1971-72 Based Upon Recommended Financing, Projection for Fiscal 1980

Institutional Type	Plan A	Plan B	Plan C	Plan D	Plan E	Plan F	Plan G	Plan H
Absolute Increase or Decrease								
Public 2-Year.....	-46,982	400,288	607,033	532,416	550,590	524,720	569,190	543,106
Public 4-Year, Lower Div....	-257,545	40,949	134,323	109,512	120,118	15,001	108,186	124,853
Public 4-Year, Upper Div....	-178,672	161,811	274,512	248,334	249,864	214,507	214,507	250,204
Public 4-Year, Graduate.....	-90,117	88,256	169,477	170,702	175,493	164,463	164,463	164,463
Total, Public Institutions	-573,316	691,304	1,185,345	1,060,964	1,096,965	918,691	1,056,346	1,082,626
Private Undergraduate.....	219,231	267,674	173,095	270,640	160,572	170,953	82,140	207,697
Private Graduate.....	106,398	69,105	61,703	64,363	64,132	64,710	64,710	64,710
Total, Private Institutions	325,629	336,779	234,798	335,003	224,704	235,663	146,850	272,407
Noncollegiate.....	424,373	412,978	304,903	313,542	317,218	215,025	238,000	380,940
Total Enrollment.....	176,686	1,441,061	1,715,046	1,709,509	1,637,987	1,369,379	1,441,196	1,735,973
Percentage Increase or Decrease								
Public 2-Year.....	-3.0%	25.5%	38.7%	33.9%	35.1%	33.4%	36.3%	34.6%
Public 4-Year, Lower Div....	-14.4	2.3	7.5	6.1	6.7	0.8	6.1	7.0
Public 4-Year, Upper Div....	-12.0	10.9	18.5	16.7	16.8	14.4	14.4	16.8
Public 4-Year, Graduate.....	-9.5	9.3	17.8	18.0	18.5	17.3	17.3	17.3
Total, Public Institutions	-9.9	11.9	20.4	18.3	18.9	15.9	18.2	18.7
Private Undergraduate.....	14.0	17.1	11.1	17.3	10.3	10.9	5.2	13.3
Private Graduate.....	20.7	13.5	12.0	12.5	12.5	12.6	12.6	12.6
Total, Private Institutions	15.7	16.2	11.3	16.1	10.8	11.3	7.1	13.1
Noncollegiate.....	26.5	25.8	19.1	19.6	19.8	13.4	14.9	24.3
Total Enrollment.....	1.8	15.2	18.2	18.1	17.3	14.5	15.2	18.4

It is evident that changes in public policy for financing postsecondary education can have direct effects on the degree of sharing of responsibility for financing public institutions; however, it is important to note that private institutions are also affected, although indirectly, by such changes. For example, a public policy change causing a rise in tuition in the public sector, without offsetting student aid, might result in the private sector becoming more attractive to students. In turn, private institutions would then experience increasing enrollments, requiring them to derive additional institutional funds, since neither tuition nor institutional aid from governments covers the full cost of each additional student. Therefore, each public policy decision potentially produces changes--in all sectors of postsecondary education--in the share that financing sources must bear.

The impacts on enrollment calculated by the model for each financing plan are presented in Part IV by institutional type and by student level. These enrollments are compared with 1977 or 1980 extrapolated financing patterns and enrollments, depending on the table being read.

Part V reflects the incremental changes in total financing, expressed in terms of the average cost per additional student. This cost per additional student does not mean, of course, that any one student receives the amount calculated. The average cost per additional student is the ratio of the net change in expenditures by all sources of support divided by the net change in enrollment.

2. Evaluation of Alternative Financing Plans at Their Own Recommended Financing Levels

In the following pages, each of the eight alternative financing plans is described according to its general policies, financing mechanisms, and, where possible, financing programs. For each financing plan, the description in this section reflects the level of financing recommended for the plan as distinguished from the common or controlled

level of financing described in the next section of this chapter. The evaluation focuses upon the effectiveness of each plan in achieving the national objectives of student access, student choice, student opportunity, and shared responsibility.

Ideally, the evaluation would also have dealt with the objectives of diversity, excellence, independence, and accountability. However, in the absence of usable quantitative measures of achievement for these four objectives, the evaluation would have been entirely judgmental, and the Commission thought it inappropriate here to present such an evaluation. The Commission nonetheless urges policy makers to make such judgments, because no financing plan should be selected on the basis of the available quantifiable evidence alone.

It must also be emphasized that the data and measures for student access, choice, opportunity, and shared responsibility are still limited and incomplete. The reader should be warned that the available data alone cannot support conclusions about any of the four objectives discussed.

The reader is reminded that the analysis of alternative financing plans that immediately follow uses the level of financing recommended for each plan and that each plan is compared with the 1977 or 1980 levels of expenditure and enrollment extrapolated from 1972 financing patterns, levels, and trends (provided in the left-hand columns of Tables 16 and 17).

Financing Plan A

This plan proposes a major shift in the responsibility for financing postsecondary education from public and private sources to students and parents. This plan recommends a total financing level* in 1980 of $45.3 billion. Of this total, public financing would be reduced in 1980 by $5.0 billion, to a total of $23.6 billion.**

*Total financing level includes all public and private expenditures for the postsecondary education enterprise.

**The $23.6 billion is obtained from Table 17, Section III by adding the sum of federal, state, and local costs (rounded to +$0.6 billion and -$5.5 billion) to the sum of the corresponding extrapolated figures from 1972 (+$13.0 billion and $15.5 billion) as shown in the left-hand column.

1. The general policies proposed under Plan A are these:
   a. The average level of tuition at public collegiate institutions should be increased so that students pay nearly the full cost of their education;
   b. Public and private tuition should reflect institutional cost differences by level and field of study; and
   c. Student aid for low-income students should be increased so as to minimize possible enrollment reductions among this group.
2. The financing mechanisms, recipients, and programs to carry out these policies follow:
   a. Public support for general institutional expense would be reduced;
   b. Tuition levels at both public and private institutions would be adjusted to reflect differences in the costs of education by level and field of study;
   c. Additional grants would be provided for needy students to cover fees and living costs; and
   d. Student loan funds and work-study opportunities would be increased.
3. Plan evaluation
   a. Student access. An enrollment decrease of approximately 1.2 million students, a change from 10.9 million to 9.7 million students (-12 percent), would be expected in 1980. Noncollegiate and private collegiate institution enrollments would increase by approximately 370,000 students, from 4.06 million to 4.43 million students (9 percent). Public collegiate enrollments, on the other hand, would be reduced by approximately 1.63 million students, from 6.85 million to 5.22 million students (-24 percent) or nearly one-quarter of their total projected enrollment.

Students from families with incomes under $10,000 would constitute approximately one-half of the enrollment reductions. Their enrollments would be reduced by approximately 560,000 students, from 3.49 million to 2.93 million students (-16 percent).

b. Student choice. To the extent that enrollments in public institutions decline while enrollments in non-collegiate and private collegiate institutions increase, student choice would increase. The large increase in tuition and fees would, however, adversely affect choice for students from families with incomes under $10,000.

c. Student opportunity. Because this plan has such a negative impact on access, it is difficult to discuss its impact on student opportunity. It may be noted, however, that the percentage reduction in 1980 of upper-division enrollment in public four-year institutions (-25 percent) would be greater than the percentage reduction for lower-division enrollment (-19 percent) in 1980. To the extent that these figures indicate that upper-division students have less opportunity to complete their programs, student opportunity would be curtailed.

d. Shared financial responsibility. This plan would result in significant shifts in the patterns of shared responsibility. In 1980, public financing of postsecondary education would change from $28.6 billion to 23.6 billion (or, from 57 percent to 52 percent of the total cost). Federal costs would increase by $0.6 billion while state and local costs would decrease by $5.5 billion. Student and family contributions would decline slightly (-2 percent) due to decreased enrollments, and institutional funds* would increase slightly (0.3 percent).

*The term "institutional funds" stands for gifts, endowment income, auxiliary enterprises, or other funds not reflected in the other categories listed in Part III of Tables 16, 17, 19, and 20.

4. Summary of Financing Plan A

At the level of financing proposed by this plan, overall* expenditures for postsecondary education would be reduced in 1980 by $5.1 billion, from $50.4 billion (assuming the extrapolated 1972 financing patterns continue to 1980) to $45.4 billion (-10 percent). Enrollments would decrease by 1.2 million students, from 10.9 million to 9.7 million students (-11 percent), substantially reducing student access. Choice for students from families with incomes under $10,000 would be adversely affected, whereas choice among the sectors for those students who would be able to attend is enhanced. Upper-division students in public four-year institutions would probably have less opportunity to complete their programs. The shared responsibility for financing postsecondary education would be significantly changed. The costs of postsecondary education borne by the public would decline by $5.0 billion (-17 percent).

The net effect of this plan is that students would carry a substantially increased burden. The implementation of this proposal would require hundreds of public institutions to increase their tuition (with the approval of their respective state authorities), to apply the additional revenues to student aid.

Financing Plan B**

This plan proposes a substantial reduction in current institutional aid and a corresponding increase in student aid. This plan recommends a total financing level in 1980 of $48.4 billion. Of this total, public financing would be reduced by $2.3 billion, to a total of $26.2 billion.

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*Throughout this section, the phrase "overall expenditures," like "total financing level," refers to the sum of all expenditures in postsecondary education.

**This plan contains several elements that are similar to those in a plan recently proposed by the Committee for Economic Development.

1. The general policies proposed under Plan B are these:

   a. State appropriations to public institutions should be reduced;

   b. Tuition at public collegiate institutions should approximate 50 percent of educational costs;

   c. Federal categorical support for institutions should be reduced; and

   d. Student aid should be increased to offset tuition increases.

2. The financing mechanisms, recipients, and programs to carry out these policies follow:

   a. Federal categorical support would be reduced by $740 million beginning in fiscal 1977;

   b. State and local institutional support would be decreased by $1.8 billion beginning in fiscal 1977;

   c. Tuition at public four-year institutions would be raised to 50 percent of the cost of instruction within five years;

   d. Tuition at public two-year institutions would be raised to 50 percent of the cost of instruction within ten years;

   e. Grants to low-income students would be increased; and

   f. Student loan funds and work-study opportunities would be increased.

3. Plan Evaluation

   a. Student access. No significant change in total enrollment in 1980 is anticipated in this plan. Public collegiate institutional enrollments would be reduced by approximately 370,000 students, from 6.85 million to 6.48 million students (-5 percent). Noncollegiate and private collegiate institution enrollments, on the other hand, would increase by approximately 370,000 students, from 4.06 million to 4.43 million students (9 percent). Enrollment from families with annual

incomes under $10,000 would increase by approximately 175,000 students, from 3.49 million to 3.66 million students (5 percent).

b. Student choice. To the extent that an increased participation rate in private institutions for students from low-income families is an indicator of greater choice, this plan would improve student choice.

c. Student opportunity. Under this plan, student aid for all undergraduates would be substantially increased, thus improving opportunity. However, since lower- and upper-division enrollments in public four-year institutions both decline in 1980 in equal proportions (-3.6 percent and -3.1 percent, respectively), the impact of this plan on student opportunity is small.

d. Shared financial responsibility. This proposal would result in significant shifts in the pattern of shared responsibility. In 1980, public financing for post-secondary education would change from $28.6 billion to $26.2 billion (or, from 57 percent to 54 percent of the total cost). Federal costs would decrease by $114 million, while state and local costs would decrease by $2.2 billion. On the other hand, student and family contributions would increase by $560 million (a change from 19 percent to 21 percent of the total), and institutional funds would increase by $150 million (1 percent).

4. Summary of Financing Plan B

At the level of financing proposed for this plan, overall expenditures would be reduced in 1980 by $1.6 billion from $50.4 billion (assuming the extrapolated 1972 financing patterns) to $48.8 billion (-3 percent). While no significant change in total enrollments is expected, public collegiate sector enrollments would decrease by about 370,000 students (-5 percent),

and noncollegiate and private collegiate sector enrollments would increase by about 370,000 students (9 percent). Student choice and opportunity would be enhanced. The costs of post-secondary education borne by the public would decline by $2.3 billion (-8 percent), while student and family contributions would be increased by $560 million (6 percent).

The implementation of this plan would require hundreds of public institutions to increase tuition (with the approval of state authorities), and the additional revenues from tuition would have to be earmarked for institutional aid.

Financing Plan C*

This plan proposes a shift in the relative proportion of student aid to institutional aid by providing proportionately greater increases in student aid than institutional aid. This plan recommends a total financing level in 1980 of $54.4 billion. Of this total, public financing would be increased by $3.5 billion, to a total of $32.1 billion.

1. The general policies proposed under Plan C are these:

   a. Access to lower-division instruction should be increased;

   b. Upper-division and graduate students should pay a larger share of their institutional costs than they currently pay;

   c. The difference between tuition at public institutions and tuition at private institutions should be substantially reduced;

   d. Tuition at public institutions should be adjusted to reflect differences in institutional cost by level of instruction;

   e. The states should provide direct aid to private institutions;

*This plan contains several elements similar to those recently recommended by the Carnegie Commission as additions to changes enacted in the Education Amendments of 1972.

f. The increase in tuition income should be used to provide additional financing for student grants;

g. The states should be encouraged to increase student financial aid; and

h. The ratio of federal to state support should be 50:50 by 1980.

2. The financing mechanisms, recipients, and financing programs to carry out these policies follow:

a. The ratio of tuition at public institutions to tuition at private institutions would be increased to 1:2.5;

b. Public tuition for the lower, upper, and graduate levels would be set at ratios of 1:1.5:3.0;

c. State-financed capitation grants would be provided to private institutions;

d. Financing for Basic Educational Opportunity Grants* would be increased to cover 75 percent of costs for eligible students enrolled in the lower-division;

e. Both federal and state governments would appropriate currently authorized funds for the State Student Incentive Grant Program;** and

f. Student loan funds and work-study support would be increased.

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*Basic Educational Opportunity Grants, enacted as part of the Education Amendments of 1972, provide an entitlement to every eligible individual to attend postsecondary education. The amount of the entitlement is based upon the individual's financial need; but it cannot exceed 50 percent of the cost of attendance or $1,400, whichever is less.

**The State Student Incentive Grant Program provides federal assistance on a dollar for dollar basis to states that either establish new state scholarship programs, or expand existing ones. In the instance of a state that expands its program, federal matching funds are available only to the extent that the state's own contribution to its program is increased. In either event, the program offered by the state must be based on financial need, and scholarships offered by the state must not exceed $1,500 to each student per year.

3. Plan Evaluation

a. Student access. An enrollment increase of approximately 300,000 students, a change from 10.9 million to 11.2 million students (3 percent), would be expected in 1980. With the single exception of private graduate enrollments (-3,000 or -0.5 percent), enrollments of all sectors are expected to increase. Enrollment of students from families with incomes below $10,000 would increase by approximately 270,000 (8 percent) in 1980.

b. Student choice. This plan would not change the distribution of enrollment by income group in public and private institutions, and, therefore, neither improves nor diminishes student choice.

c. Student opportunity. Under this plan, the enrollment changes at public four-year institutions would be approximately the same for both lower- and upper-division students, indicating that there would be no change in the opportunities afforded students in those institutions to complete their programs. Rather, large amounts of unrestricted institutional aid, through capitation grants, would be provided private institutions. If institutions provided better counseling and remedial assistance to their students, student opportunity in the private sector may be improved.

d. Shared financial responsibility. This proposal would result in a slight increase in the public share of financing postsecondary education and a slight decrease in the student and family share. In 1980, public financing for postsecondary education would change from $28.6 billion to $32.1 billion (or, from 57 percent to 59 percent of the total cost). Student and family contributions would increase by $390 million, a change from 19 percent to 18.5 percent of the total. The needed level of institutional funds would be relatively insignificant (0.7 percent).

4. Summary of Financing Plan C

At the level of financing proposed for this plan, overall expenditures for postsecondary education would increase in 1980 by about $4.0 billion, from $50.4 billion (assuming the extrapolated 1972 financing patterns continue to 1980) to $54.4 billion (8 percent). Enrollments in all sectors, except at the graduate level in private institutions, would increase by about 300,000 students (3 percent). Public financing for postsecondary education would increase by $3.5 billion (12 percent), while student and family contributions would increase by $390 million (4 percent).

Implementation of this plan would require hundreds of public institutions to increase tuition. It would also require the states to respond favorably to the federal incentive program intended to induce states to increase substantially their financing of student grants.

Financing Plan D

This plan proposes a shift in the relative proportion of student aid to institutional aid, with a substantial increase of financial aid to students, particularly to students attending private institutions. This plan recommends a total financing level in 1980 of $53.5 billion. Of this total, public financing would be increased by $2.3 billion, to a total of $30.9 billion.

1. The general policies proposed under Plan D are these:

   a. Access to postsecondary education should be increased with emphasis on undergraduate education;

   b. Public tuition at the lower division should only be adjusted for inflation; upper-division and graduate-level tuition should rise somewhat more than the inflation adjustment. The additional tuition revenue should be used to provide student aid;

c. Student aid should be increased at all undergraduate levels, at both public and private institutions, with particular attention to students attending private institutions; and

d. Graduate education in fields critical to society should be stimulated.

2. The financing mechanisms, recipients, and financing programs to carry out these policies follow:

a. Public upper-division and public-graduate tuitions would be raised by an additional $50 and $100 with the incremental revenue going to student aid;

b. Needy students would receive increased financial aid;

c. To facilitate choice, the maximum entitlement in the Basic Educational Opportunity Grants would be raised from $1,400 to $1,900;

d. The ceiling on family income for eligibility for basic grants would be raised from $15,000 to $18,000; and

e. Merit-based graduate fellowships would be provided in critical fields.

3. Plan Evaluation

a. Student access. An enrollment increase of approximately 300,000 students, a change from 10.9 million to 11.2 million students (3 percent), would be expected in 1980. With the exception of a slight reduction in the public two-year sector (-37,000 students), enrollments in all sectors would either increase or remain unchanged. It should be noted, however, that overall public collegiate enrollments would increase only slightly (4,600 or 0.1 percent students) while noncollegiate and private collegiate enrollments would increase by approximately 260,000 students (7 percent). Enrollment of students

from families with incomes below $10,000 would increase by 230,000 students (7 percent).

b. Student choice. The number of undergraduate students enrolled in public institutions would remain essentially unchanged under this plan, but the comparable enrollment in private institutions would increase by about 190,000 students and the number enrolled in noncollegiate institutions would increase by about 80,000 students in 1980. To this extent, student choice would appear to be improved.

c. Student opportunity. Under this plan, some unrestricted institutional aid is provided to private institutions through small cost-of-education supplements for students receiving aid. If private institutions used the additional funds to provide better counseling and remedial assistance to students, student opportunity in the private sector may be enhanced.

d. Shared financial responsibility. This plan would result in a slight shift in the sharing of financial responsibility. In 1980, public financing of postsecondary education would change from $28.6 billion to $30.9 billion (or from 57 percent to 58 percent of the total). Student and family contributions would slightly increase by about $600 million (or 0.2 percentage points of the total cost). Institutional funds would be increased by approximately $200 million or 2 percent.

4. Summary of Financing Plan D

At the level of financing proposed for this plan, overall expenditures for postsecondary education would increase in 1980 by $3.1 billion, from $50.4 billion (assuming the extrapolated 1972 financing patterns continue to 1980) to $53.5 billion (6 percent). Enrollments would increase by approximately 300,000 students (3 percent), with most of this increase occurring in the noncollegiate and private collegiate sector.

Public financing for postsecondary education would increase by $2.3 billion (8 percent) while student and family contributions would be increased by about $600 million (6 percent).

Implementation of this plan would require the states to respond favorably to a federal program of incentives for institutional aid to private institutions.

Financing Plan E

This plan proposes to hold lower-division tuition in public institutions stable (with adjustment for inflation only) while substantially increasing aid to private institutions to enable them to improve their competitive position relative to public institutions. This plan recommends a total financing level in 1980 of $52.9 billion. Of this total, public financing would increase by $1.9 billion, to a total of $30.6 billion.

1. The general policies proposed under Plan E are these:
   a. Emphasis should be given to reducing financial barriers to students during the first two years of study, with the student's share of the cost increasing thereafter;
   b. Lower-division tuition should be stabilized while upper-division and graduate tuition are increased somewhat;
   c. The revenue from increased tuition at the upper-division and graduate levels should be used to raise student aid at those levels; and
   d. State support for private institutions should be greatly increased, especially for lower-division instruction.
2. The financing mechanisms, recipients, and financing programs to carry out these policies follow:
   a. Lower-division tuition at public institutions would be stabilized at the 1973 level, to be adjusted only for inflation. Upper-division and graduate tuition charges would rise by 10 percent per year beginning in 1977 until they reach 35 percent of upper-division costs of instruction and 40 percent of graduate-level costs;

b. The states would provide aid to private collegiate and noncollegiate institutions equal to 10 percent of the cost of instruction in public institutions for each lower-division and upper-division student; and

c. The additional revenue from upper-division and graduate tuition would be used to increase student aid at those levels on the basis of need.

3. Plan Evaluation

a. Student access. An enrollment increase of approximately 200,900 students (2 percent) would be expected in 1980. With the exception of a slight reduction in the public two-year sector (-19,000 students), enrollments in all sectors either increase or remain unchanged. It should be noted, however, that overall public enrollments increase only slightly (40,000 students or 0.6 percent) while noncollegiate and private collegiate enrollments increase by approximately 160,000 students (4 percent). Enrollments of students from families with incomes below $10,000 would increase by approximately 170,000 students (5 percent).

b. Student choice. The increase in need-based student grants would lower the net cost of attending public four-year institutions and private institutions more than for public two-year colleges. This result would probably cause students to shift out of public two-year colleges and into public four-year colleges, private colleges, and noncollegiate institutions. This shift would reflect an increase in student choice.

c. Student opportunity. Under this plan, upper-division tuition would increase slightly. But the increase in student aid would more than offset the tuition change, and upper-division enrollment would rise more than lower-division enrollment, thus indicating some increase

aid to private institutions, opportunity may be increased.

d. Shared financial responsibility. This plan would result in slight shifts in the sharing of financial responsibility. In 1980, public financing of post-secondary education would change from $28.6 billion to $30.6 billion (or from 57 percent to 58 percent of the total cost). Student and family contributions would remain unchanged at 19 percent of the total. Institutional funds would not change significantly (0.6 percent).

4. Summary of Financing Plan E

At the level of financing proposed for this plan, overall expenditures for postsecondary education would increase in 1980 by $2.4 billion, from $50.4 billion (assuming that the extrapolated 1972 financing patterns continue to 1980) to $52.9 billion (5 percent). Enrollments would increase by about 200,000 students (2 percent). Public financing for postsecondary education would increase by $2.0 billion (7 percent) while student and family contributions would be increased by $350 million (4 percent).

Because of the state aid to private institutions, the implementation of this plan would require the approval of the states and public institutions.

Financing Plan F

This plan proposes to shift responsibility for financing post-secondary education at the lower division from students and parents to public sources and to increase aid to institutions while reducing aid to students. This plan recommends a total financing level in 1980 of $51.0 billion. Of this total, public financing would be increased by $440 million to a total of $29.0 billion.

1. The general policies proposed under Plan F are these:
   a. The first two years of postsecondary education should be open to all individuals who seek to enroll;

b. Tuition at the lower division for public two-year and four-year institutions should be eliminated; and

c. The federal government should provide institutional aid to make such elimination of tuition possible.

2. The financing mechanisms, recipients, and financing programs to carry out these policies follow:

a. By 1977, tuition and other fees would be eliminated for all lower-division students attending public institutions in the collegiate sectors;

b. Federal grants to lower-division students would be reduced accordingly;

c. Federal aid to lower-division students in private institutions would be increased to offset, in full, tuition and other fees; and

d. Federal support would be provided to public institutions in the form of capitation grants to replace the loss of tuition at the lower-division level.

3. Plan Evaluation

a. Student access. Because the concomitant reduction in student aid more than offsets the reduction in tuition, an enrollment decrease of about 70,000 lower-division students (-0.7 percent) would be expected in 1980. These decreases occur in all sectors, except for the private undergraduate collegiate sector, which would increase by about 90,000 students (5 percent). Enrollment of students from families with incomes below $10,000 would decrease by about 110,000 students (-3 percent).

b. Student choice. Although access would be reduced by this plan, and public institutions would experience a decline in lower-division enrollment, private undergraduate enrollments would increase. Some increase in student choice would result.

c. Student opportunity. Under this plan, student opportunity is not significantly affected. All of the tuition and student-aid changes occur at the lower-division level and, consequently, there is no change in upper-division enrollments.

d. Shared financial responsibility. This plan would not significantly alter the patterns of shared responsibility for financing postsecondary education.

4. Summary of Financing Plan F

At the level of financing proposed for this plan, overall expenditures for postsecondary education would increase in 1980 by $59.0 million, from $50.4 billion (assuming the extrapolated 1972 financing patterns continue to 1980) to $51.0 billion (1 percent). Enrollments would decrease by about 70,000 students (-0.7 percent). Public financing for postsecondary education would be increased by $440 million (2 percent), while student and family contributions would increase by $100 million (1 percent).

Implementation of this plan, reducing public tuition at the lower division, would require action on the part of state governments and public institutions.

Financing Plan G

This plan proposes a shift in the relative proportion of student aid to institutional aid by providing increased aid to collegiate institutions while holding student aid constant. This plan recommends a total financing level in 1980 of $51.3 billion. Of this total, public financing would increase by about $87 million, to a total of $29.4 billion.

1. The general policies proposed under Plan G are these:

a. The federal government should provide increased aid to collegiate institutions to offset a serious financial crisis among them; and

b. This federal aid should serve to foster maximum diversity among collegiate institutions.

2. The financing mechanisms, recipients, and financing programs to carry out these policies follow:

   a. Federal aid to institutions would be provided in the form of general institutional support based on reported enrollment. No other major financing mechanisms are proposed; and

   b. The formula for providing institutional aid would be $100 per full-time equivalent lower-division student, $150 per full-time equivalent upper-division student, and $200 per full-time equivalent graduate student, with an additional payment of $300 per student for the first 200 students and $200 per student for the next 100 students.

3. Plan Evaluation

   a. Student access. This plan would provide direct institutional assistance without any constraints or requirements on its use by the recipient institutions. Because there is no assurance that tuition would be reduced or that institutional student aid would be expanded, there would be no necessary increase in student aid. Thus, there would be no necessary increase in student access. To the extent, however, that the additional institutional aid would be used to reduce tuition, provide student aid, or otherwise enhance the attractiveness of educational programs to low-income students, access would be increased.

   b. Student choice. Because of the characteristics of this particular plan, no quantitative estimate of student choice was made. However, if an institution used its additional assistance to provide additional student aid, student choice would be increased.

c. Student opportunity. If an institution applied its additional assistance to providing more academic tutoring and career counseling, student opportunity may increase.

d. Shared financial responsibility. This plan would result in slight shifts in the sharing of financial responsibility. In 1980, public financing of postsecondary education would change from $28.6 billion to $29.4 billion (or, from 56.6 percent to 57.3 percent of the total cost), while student and family contributions would remain unchanged at 19 percent of the total. Institutional funds would also remain unchanged. All of the additional costs of this plan would be borne by the federal government. If state governments, in response to the increased federal support, however, withdrew support from public institutions, the effect of this plan would be partially vitiated.

4. Summary of Financing of Plan G

At the level of financing proposed for this plan, overall expenditures for postsecondary education would increase in 1980 by $870 million, from $50.4 billion (assuming the extrapolated 1972 financing patterns continue to 1980) to $51.3 billion (2 percent). No changes in enrollments would be expected. Public financing for postsecondary education would increase by about $870 million (3 percent) while student and family contributions would remain unchanged.

Financing Plan H*

This plan proposes a shift in the relative proportion of student aid to total public aid by increasing both student aid and institutional aid, but by increasing student aid relatively more than institutional aid. This plan recommends a total financing level in 1980 of $55.1 billion. Of this total, public financing would increase by $4 billion, to a total of $32.6 billion.

*This plan is based on the major postsecondary education sections of the Education Amendments of 1972.

1. The general policies proposed under Plan H are these:

   a. Tuition at public and private institutions should be held stable (with adjustments for inflation only);

   b. The federal government should provide Basic Educational Opportunity Grants (BEOG) to encourage access;

   c. The federal government should provide general institutional assistance supplemented by categorical aid that is targeted on special problems in postsecondary education;

   d. States should be encouraged to hold constant their assistance to institutions and increase their assistance to students; and

   e. Parents and families should be encouraged to continue their assistance to students.

2. The financing mechanisms, recipients, and financing programs to carry out these policies follow:

   a. Support for the federal Basic Educational Opportunity Grants (BEOG) program would be substantially increased;

   b. The federal government would appropriate all authorized funds for the State Student Incentive Grant Program; states would appropriate the necessary matching funds;

   c. Direct institutional aid would be extended to all nonprofit postsecondary educational institutions in proportion to the number of BEOG recipients enrolled and the dollar volume of other forms of federal student assistance; and

   d. Aid would be provided for developing institutions, library improvement, and other categorical programs.

3. Plan Evaluation

   a. Student access. An enrollment increase of approximately 260,000 students (2 percent) would be expected in 1980.

With the exception of enrollments in the public two-year sector (-30,000 students), enrollment in all sectors would increase or remain unchanged. Public enrollments would increase by approximately 20,000 students (0.4 percent) while noncollegiate and private collegiate enrollments would increase by about 230,000 students (6 percent). Enrollments of students from families with incomes below $10,000 would increase by 230,000 students (7 percent).

b. Student choice. The increase in total enrollment is the result of a .5 percent estimated decrease for public two-year colleges, .5 percent estimated increase for public four-year colleges, an estimated 2.4 percent increase for private colleges, and an estimated 2.6 percent increase for noncollegiate institutions. This shift of enrollment growth towards the private and noncollegiate institutions could be interpreted as increased student choice.

c. Student opportunity. Under this plan, upper-division enrollment would increase at a rate greater than lower-division enrollment (.9 percent versus .4 percent), indicating an increase in the likelihood of an individual's completing his or her program.

d. Shared financial responsibility. This proposal would result in slight shifts in the sharing of financial responsibility. In 1980, public financing in post-secondary education would change from $28.6 billion to $32.6 billion (or 57 percent to 59 percent of the total cost). Student and family contributions would change in 1980 from 19 percent to about 18.6 percent of the total. The needed level of institutional funds would increase by $135 million (one percent).

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4. Summary of Financing Plan H

At the level of financing proposed for this plan, overall expenditures for postsecondary education would increase in 1980 by $4.7 billion, from $50.4 billion (assuming the extrapolated 1972 financing patterns continue to 1980) to $55.1 billion (9 percent). Enrollments would increase by about 260,000 students (2 percent). Public financing for postsecondary education would increase by $4.0 billion (14 percent) while student and family contributions would increase by $510 million (5 percent).

Because virtually all of the additional public funds would be federal, this plan could be readily implemented without requiring simultaneous state, local, and institutional decisions (except with respect to the State Student Incentive Grant Program).

3. Choosing Among Alternative Financing Plans

The previous section has demonstrated the use of an analytical model developed by the Commission to assess the costs and impacts of alternative financing plans. The analysis of alternative plans shows that the degree of achievement of objectives differs significantly among the plans. However, the analysis, at this stage of its development, does not indicate whether the different impacts of alternative financing plans occur because of the different levels of financing (simply spending more or less money) or because of the different mechanisms (the means by which assistance is delivered and the recipients of assistance).

This present section demonstrates the results of going one step further in the analysis. To control the effects of different levels of financing, increases in public expenditures were set at arbitrarily established figures of $1.0 billion additional for 1977 (see Table 19) and $1.5 billion additional for 1980 (see Table 20). For these levels of additional public expenditures, the analytical

Table 19: Estimated Changes in Cost, Tuition, and Enrollment Resulting from Alternative Financing Plans, Assuming $1.0 Billion Additional Public Financing, Fiscal 1977

Extrapolated 1972 Financing Figures		Increases or Decreases from Current Financing Projection							
		Plan A	Plan B	Plan C	Plan D	Plan E	Plan F	Plan G	Plan H
	I. PROPOSED PUBLIC FINANCING POLICIES[1]								
	Student Aid:								
$6,541,500,000	Federal	$1,800,000,000	$969,600,000	$136,753,008	$758,949,376	$621,375,392	-$1,185,468,930	$0	$426,029,056
723,000,000	State	4,925,001,750	2,324,999,940	45,584,000	208,718,624	0	469,686,784	0	26,626,816
	Institutional Aid:[2]								
4,762,000,000	Federal	0	-740,599,808	0	8,991,578	0	1,879,045,630	115*	106
12,508,000,000	State and Local	400*	-1,584,999,680	622,586,944	0	101*	0	0	39,940,000
0	Federal Aid Through States[3]	0	0	22,792,000	208,718,624	0	469,686,784	0	13,313,410
	II. AVERAGE TUITION (Before Student Aid)								
$192	Public Two-Year	$1,847	$123	$214	$0	$0	-$192	$0	$0
583	Public Four-Year, Lower Division	1,456	75	-173	0	0	-583	0	0
583	Public Four-Year, Upper Division	1,456	75	32	50	57	0	0	0
583	Public Four-Year, Graduate	1,456	75	647	100	57	0	0	0
2,039	Private, Undergraduate	0	0	0	0	0	0	0	0
2,039	Private, Graduate	0	0	0	0	0	0	0	0
1,326	Noncollegiate	0	0	0	0	0	0	0	0
	III. PROJECTED COST BY SOURCE								
$11,403,100,000	Federal	$1,304,432,380	$234,289,152	$146,649,376	$844,267,008	$625,167,776	$686,740,224	$999,857,408	$921,054,720
13,231,000,000	State and Local	-303,788,808	765,763,219	863,507,510	277,162,087	737,424,384	513,806,093	0	67,036,526
10,064,100,000	Institutional Funds[4]	187,250,592	195,833,664	4,272,056	85,978,976	28,334,992	38,500,912	0	29,973,264
8,219,000,000	Students and Family	601,094,144	721,305,600	53,263,848	253,574,816	149,936,256	97,851,008	0	110,975,440
$42,917,600,000	Total Costs	$1,788,988,160	$1,917,191,420	$1,067,892,480	$1,460,982,530	$1,190,863,100	$1,136,898,050	$999,857,408	$1,129,041,660

[1] All additional student and institutional aid figures are based on a maximum eligible family income of $15,000, except Plan D model, which has an eligibility ceiling of $18,000.

[2] Consists of block grants, capitation grants, or dollars per student aided.

[3] The money the federal government would give state or local governments to be distributed for postsecondary education.

[4] Includes such funds as income from gifts, endowments, and auxiliary enterprises.

* Dollars per student.

Table 19 (continued)

Extrapolated 1972 Financing Figures		Increases or Decreases from Current Financing Projection							
		Plan A	Plan B	Plan C	Plan D	Plan E	Plan F	Plan G	Plan H
	IV. PROJECTED ENROLLMENT								
1,990,000	Public Two-Year	-347,755	-56,118	19,104	-18,706	-10,348	-34,2[illegible]	0	-6,567
1,856,800	Public Four-Year, Lower Division	-162,841	18,382	41,221	-371	6,870	-54,776	0	4,456
1,666,480	Public Four-Year, Upper Division	-164,148	48,828	8,332	15,331	15,16[illegible]	0	0	9,332
1,118,720	Public Four-Year, Graduate	-215,801	-11,075	18,794	6,265	4,475	0	0	0
6,632,000	Total, Public Institutions	-890,045	17	87,451	6,519	16,162	-89,00[illegible]	0	7,221
1,515,695	Private, Undergraduate	285,254	208,711	7,578	90,630	36,225	78,968	0	30,769
566,305	Private, Graduate	12,062	623	-1,925	-283	-227	0	0	0
2,082,000	Total, Private Institutions	297,316	209,334	5,653	90,356	35,998	78,96[illegible]	0	30,769
1,732,000	Noncollegiate	257,029	184,978	-2,078	35,160	43,993	-26,[illegible]76	0	28,232
10,446,000	Total Enrollment	-[illegible]35,700	394,329	91,026	132,015	96,153	-36,362	0	66,222
	Undergraduate Enrollment by Family Income:								
3,344,117	Less than $10,000	180,917	390,593	69,558	116,710	87,281	-68,220	0	60,529
2,615,557	$10,000 to $14,999	-126,331	37,402	7,585	13,078	9,154	10,462	0	7,847
2,898,[illegible]01	$15,000 and over	-167,812	-9,564	-2,608	2,029	-2,319	26,375	0	0
	V. PROJECTED COST PER ADDITIONAL STUDENT (RATIO OF INCREMENTAL COST TO INCREMENTAL ENROLLMENT)								
	Federal Government	--	$293	$911	$3,316	$2,686	--	--	$7,162
	State and Local Governments	--	960	5,355	1,088	2,562	--	--	521
	Student and Family	--	903	330	996	807	--	--	[illegible]63
	Private Sources	--	245	26	338	152	--	--	233
	Total Cost Per Additional Student	--	$2,401	$6,625	$5,738	$6,408	--	--	$8,779

Table 20: Estimated Changes in Cost, Tuition, and Enrollment Resulting from Alternative Financing Plans, Assuming $1.5 Billion Additional Public Financing, Fiscal 1980

Extrapolated 1972 Financing Figures		Increases or Decreases from Current Financing Projection							
		Plan A	Plan B	Plan C	Plan D	Plan E	Plan F	Plan G	Plan H
	I. PROPOSED PUBLIC FINANCING POLICIES[1]								
	Student Aid:								
$7,746,900,000	Federal	$2,100,000,000	$1,839,000,060	$292,600,064	$1,058,893,820	$932,985,760	-$1,532,313,860	$0	$667,767,552
827,000,000	State	5,225,000,960	4,415,000,580	64,372,900	257,005,760	0	684,553,984	0	37,098,192
	Institutional Aid:[2]								
5,212,000,000	Federal	0	-876,999,936	0	10,836,506	0	2,628,982,780	160*	148
14,671,300,000	State and Local	600*	-1,876,409,710	941,263,872	0	127*	0	0	56,647,264
0	Federal Aid Through States[3]	0	0	32,186,000	257,005,760	0	684,553,984	0	18,549,104
	II. AVERAGE TUITION (before Student Aid)								
$228	Public Two-Year	$2,187	$658	$347	$0	$0	$228	$0	$0
691	Public Four-Year, Lower Division	1,724	516	-116	0	0	-691	0	0
691	Public Four-Year, Upper Division	1,724	516	171	50	82	0	0	0
691	Public Four-Year, Graduate	1,724	516	1,034	100	162	0	0	0
2,415	Private, Undergraduate	0	0	0	0	0	0	0	0
2,415	Private, Graduate	0	0	0	0	0	0	0	0
1,570	Noncollegiate	0	0	0	0	0	0	0	0
	III. PROJECTED COST BY SOURCE								
$13,058,900,000	Federal	$1,515,685,630	$871,441,152	$305,285,376	$1,163,588,350	$942,489,504	$1,084,513,220	$1,498,204,420	$1,386,862,080
15,498,300,000	State and Local	-15,676,008	630,100,604	1,201,753,251	350,000,443	579,638,516	415,791,834	0	99,372,945
12,126,100,000	Institutional Funds[4]	281,018,112	337,704,192	8,280,802	132,557,450	58,639,104	62,686,432	0	53,635,984
9,733,700,000	Students and Family	762,232,832	1,248,994,050	86,093,104	396,930,560	268,347,360	154,492,304	0	200,972,736
$50,417,000,000	Total Costs	$2,543,260,420	$3,088,239,870	$1,601,412,100	$2,043,076,610	$1,849,114,110	$1,717,483,260	$1,498,204,420	$1,740,843,260

[1] All additional student and institutional aid figures are based on a maximum eligible family income of $15,000, except Plan D model, which has an eligibility ceiling of $18,000.

[2] Consists of block grants, capitation grants, or dollars per student aided.

[3] The money the federal government would give state or local governments to be distributed for postsecondary education.

[4] Includes such funds as income from gifts, endowments, and auxiliary enterprises.

* Dollars per student.

Table 20 (continued)

Extrapolated 1972 Financing Figures		Increases or Decreases from Current Financing Projection							
		Plan A	Plan B	Plan C	Plan D	Plan E	Plan F	Plan G	Plan H
	IV. PROJECTED ENROLLMENT								
2,138,000	Public Two-Year...	-485,326	-143,460	34,208	-25,015	-14,110	-50,029	0	-10,476
1,894,000	Public Four-Year, Lower Division...	-228 227	-17,235	23,675	568	9,091	-79,359	0	6,629
1,699,865	Public Four-Year, Upper Division...	-241,891	21,758	28,898	24,478	29,748	0	0	14,269
1,114,135	Public Four-Year, Graduate.....	-254,580	-76,207	5,014	6,239	11,030	0	0	0
6,846,000	Total, Public Institutions.....	-1,210,024	-215,144	91,795	6,270	35,759	-129,388	0	10,422
1,647,730	Private, Undergraduate.....	350,802	351,296	16,807	125,227	59,648	115,671	0	49,597
578,270	Private, Graduate.....	14,630	4,395	-3,007	-347	-578	0	0	0
2,226,000	Total, Private Institutions.....	365,432	355,691	13,800	124,880	59,070	115,671	0	49,597
1,838,000	Noncollegiate.....	312,828	300,697	3,308	50,729	60,286	-37,311	0	44,112
10,910,000	Total Enrollment.....	-531,764	441,244	108,903	181,879	155,115	-51,028	0	104,131
	Undergraduate Enrollment by Family Income:								
3,487,073	Less than $10,000.....	88,920	567,347	117,863	115,175	133,904	-93,454	0	92,407
2,725,971	$10,000 to $14,999.....	-174,190	7,905	4,362	17,446	14,175	10,632	0	11,722
3,004,551	$15,000 and over.....	-206,713	-61,894	15,323	3,005	-3,605	31,848	0	0
	V. PROJECTED COST PER ADDITIONAL STUDENT (RATIO OF INCREMENTAL COST TO INCREMENTAL ENROLLMENT)			$1,347	$3,452	$2,553	--	--	$7,060
	Federal Government.....	--	$864	5,300	1,038	2,718	--	--	506
	State and Local Governments.....	--	625	380	1,178	929	--	--	1,023
	Student and Family.....	--	1,230	37	393	203	--	--	273
	Private Sources.....	--	335	$7,066	$6,062	$6,404	--	--	$8,861
	Total Cost Per Additional Student	--	$3,061						

model was used to estimate the impacts of each plan on the objectives. This approach addresses the question: What is the relative effectiveness of each plan in the achievement of each objective? The results of this analysis at a controlled level of financing provide new information that could aid policy makers to select among alternative financing plans. Once a financing plan is selected, the effectiveness of different levels of financing on the achievement of objectives should be evaluated to determine the most appropriate level of financing.

In this analysis, the Commission only used quantitative measures for student-related objectives because of the limited stage of development of criteria for other objectives. Of the student-related objectives, access and choice are the two most directly addressed by the analytical model and, therefore, are the focus of this section. The results of the analysis of impacts produced by the controlled, or common, levels of financing are shown in Part IV of Tables 19 and 20. The comparative impacts of the eight alternative financing plans are discussed below in terms of their effects on access and choice.

Part IV of Tables 19 and 20 shows the changes in enrollment estimated for each plan at the controlled level of financing. The pattern of results in 1977 and 1980 are very similar and, therefore, only the 1980 results will be discussed in detail.

The Commission stresses, however, that policy makers should not select a financing plan on the basis of an analysis that evaluates the achievement of only two objectives. To the extent possible, policy makers should judgmentally evaluate the achievement of additional objectives. This judgment should supplement the type of quantitative analysis discussed below.

Access

Plan A would, it is estimated for 1980, increase the undergraduate enrollment of individuals from families earning less than $10,000 by about 89,000 (3 percent) while reducing the enrollment of middle- and upper-income students by about 380,000 (-7 percent). The overall effect of Plan A on enrollments would be to reduce total enrollment by about 532,000 (-5 percent).

Plan B would, it is estimated for 1980, increase the undergraduate enrollment of low-income individuals by about 570,000 (16 percent), and of middle-income individuals by about 8,000 (0.3 percent), while reducing upper-income undergraduate enrollments by about 62,000 individuals (-2 percent). The overall effect of Plan B on enrollments would be to increase total enrollment by about 440,000 (4 percent).

Plan C would, it is estimated for 1980, increase the undergraduate enrollment of low-income individuals by about 118,000 (3 percent), of middle-income individuals by about 4,000 (0.15 percent), and of upper-income individuals by about 15,000 (0.5 percent). The overall effect of Plan C on enrollments would be to increase total enrollments by about 109,000 (1 percent).

Plan D would, it is estimated for 1980, increase the undergraduate enrollment of low-income individuals by about 115,000 (3 percent), of middle-income individuals by about 17,000 (0.6 percent), and of upper-income individuals by about 3,000 (0.1 percent). The overall effect of Plan D on enrollments would be to increase total enrollments by about 182,000 (2 percent).

Plan E would, it is estimated for 1980, increase the undergraduate enrollment of low-income individuals by about 134,000 (4 percent), of middle-income individuals by about 14,000 (0.5 percent), while increasing the undergraduate enrollments of upper-income individuals by about 4,000 (-0.1 percent). The overall effect of Plan E on enrollments would be to increase total enrollment by about 155,000 (1 percent).

Plan F would, it is estimated for 1980, decrease the undergraduate enrollments of low-income individuals by about 93,000 (3 percent) while increasing the undergraduate enrollment of middle-income individuals by about 11,000 (0.4 percent), and of upper-income individuals by about 32,000 (1 percent). The overall effect of Plan F on enrollments would be to decrease total enrollment by about 51,000 (-0.5 percent).

Plan G has no quantitative evidence of enrollment impacts because only institutional aid was involved and no projection was made as to how institutions might use the aid to affect enrollments.

Plan H would, it is estimated for 1980, increase the undergraduate enrollment of low-income individuals by about 92,000 (3 percent), and of middle-income individuals by about 12,000 (0.4 percent) without changing upper-income enrollment. The overall effect of Plan H on enrollment would be to increase total enrollment by about 104,000 (1 percent).

In summary, for the same level of expenditure of public funds Plan B would produce the greatest increase in low-income enrollments; Plan D would produce the greatest increase in middle-income enrollment; and Plan F would produce the greatest increase in upper-income enrollments. Plan B would also produce the largest increase in total enrollments. Plans A and F would reduce total enrollments while, at the same level of expenditure of public funds, Plans B, C, D, E, and H would all increase total enrollments. Plan F is the only one of the eight plans presented which would decrease low-income enrollment.

Choice

Plan A would, it is estimated for 1980, increase enrollments in private collegiate institutions by about 365,000 (16 percent), and in noncollegiate institutions by about 313,000 (17 percent), while public collegiate enrollments would decrease by about 1,210,000 (-13 percent). Just over half of the loss of public enrollments would be compensated for by increases in private and noncollegiate enrollments.

Plan B would, it is estimated for 1980, increase private collegiate enrollments by about 356,000 (16 percent), and noncollegiate enrollments by about 301,000 (16 percent), while decreasing public collegiate enrollments by about 215,000 (-3 percent). The enrollment growth in the private collegiate and

the noncollegiate sectors would be three times the loss in enrollment in the public collegiate sector.

Plan C would, it is estimated for 1980, increase enrollment in all sectors with public collegiate enrollments rising about 92,000 (1 percent), private enrollments rising about 14,000 (0.6 percent), and noncollegiate enrollments rising about 3,000 (0.2 percent).

Plan D would, it is estimated for 1980, increase enrollments in all sectors with public collegiate enrollments increasing by about 6,000 (0.1 percent), private collegiate enrollments increasing by about 125,000 (6 percent), and noncollegiate enrollments increasing by about 51,000 (3 percent).

Plan E would, it is estimated for 1980, also increase enrollments in all sectors with public collegiate enrollments increasing by about 36,000 (0.5 percent), private collegiate enrollments increasing by about 59,000 (3 percent), and noncollegiate enrollments increasing by about 60,000 (3 percent).

Plan F would, it is estimated for 1980, decrease public collegiate enrollments by about 129,000 (-2 percent), increase private collegiate enrollments by about 116,000 (5 percent), and decrease noncollegiate enrollments by about 37,000 (-2 percent).

Plan G again has no quantitative evidence of enrollment impacts and therefore, no measures of student choice.

Plan H would, it is estimated for 1980, increase enrollment in all sectors with public collegiate enrollment increasing by about 10,000 (0.1 percent), private collegiate enrollments increasing by about 50,000 (2 percent), and noncollegiate enrollments increasing by about 44,000 (2 percent).

The previous discussion has outlined the achievement of access and choice by the eight financing plans all controlled for the same level of public expenditures. Other objectives are also important to policy makers, and conclusions should not be based only on access and

choice but also the judgmental evaluation of the achievement of other objectives.

The selection of a financing plan should be based on an overall evaluation of the achievement of all the objectives important to a policy maker looking at a variety of financing plans, all of which are analyzed at the same level of financing. The selection of the level of financing of the desired financing plan should be based on two factors: (1) an overall evaluation of the achievement of all the objectives important to a policy maker looking at a variety of levels of financing of the desired plan, and (2) the priorities of the policy maker for the achievement of postsecondary education objectives in relationship to other objectives.

4. Generalizations About Financing Alternatives

The Commission's extensive analytical work has made possible several generalizations about financing postsecondary education that are of particular significance to the evaluation of financing policies and plans. An understanding of these analytical results enables policy makers to anticipate the probable consequences of financing decisions. This understanding will also help policy makers select for further analysis those financing plans that are most likely to achieve the objectives they wish to pursue. Five generalizations yielded by the Commission's work concern: (1) targeted student assistance compared with general student assistance; (2) the effect of tuition changes on enrollment; (3) the differential impact of increases in student grants; (4) the effect of changes in the maximum income allowed for student grant eligibility; and (5) the level of institutional aid necessary to supplement student grant funds.

As a result of the limited data available (see Chapter 5.), these generalizations pertain to student enrollment responses to changes in financing policies. When appropriate data become available, generalizations about both institutional response and the interrelationships among financing sources should be possible. The five generalizations developed follow:

1. *At any given level of financing, targeted student assistance plans (such as grants to needy students) are more effective for improving student access than general student assistance (such as tuition reduction).*

It is often assumed that a substantial reduction in tuition (general student assistance) will do as much to improve access as a comparable amount of aid granted directly to needy students (targeted student assistance). However, it can be clearly demonstrated that aid to reduce tuition will accomplish less in improving access than the same amount applied to student grants awarded on the basis of financial need.

This relative efficiency of targeted as distinguished from general student assistance occurs for two reasons: (a) individuals from low-income families are more responsive to the same amount of additional aid per person than are individuals from upper-income families; and (b) the more limited the number of eligible recipients, the larger the aid available per recipient for the same amount of money.

Under either targeted or general student assistance plans, the cost of the additional students enrolled will be in the range of $3,000 to $10,000. For example, if 100,000 students were eligible for assistance and already were receiving awards averaging $300 each, an increase in the average award to $400 per student to attract additional students would bring each of the students already enrolled an additional $100. Individuals respond to changes in the net price of attending postsecondary education institutions.* But, as staff research utilizing student price response coefficients discovered, a decrease of $100 in tuition brings an increase in enrollment of only about 1 to 3 percent, to a total in this instance of between 101,000 to 103,000 students. The cost of the grant program would be between $10.1 million and $10.3 million, and the number of additional students would be between 1,000 and 3,000. Therefore, the

*If individuals did not respond to price changes, then neither student aid nor tuition would have any impact on enrollments; but both empirical research and personal experience suggest the contrary.

cost per additional student would range from $3,000 to $10,000.

In short, large amounts of assistance applied through a general financing mechanism, such as reduced tuition, may have very little impact on access. The narrower the group of recipients eligible under the financing mechanism, the fewer the students already in the system who will receive assistance. Targeted student-aid programs, such as the Basic Educational Opportunity Grants, which are based on need, should be more effective in the accomplishment of student access than generalized support.

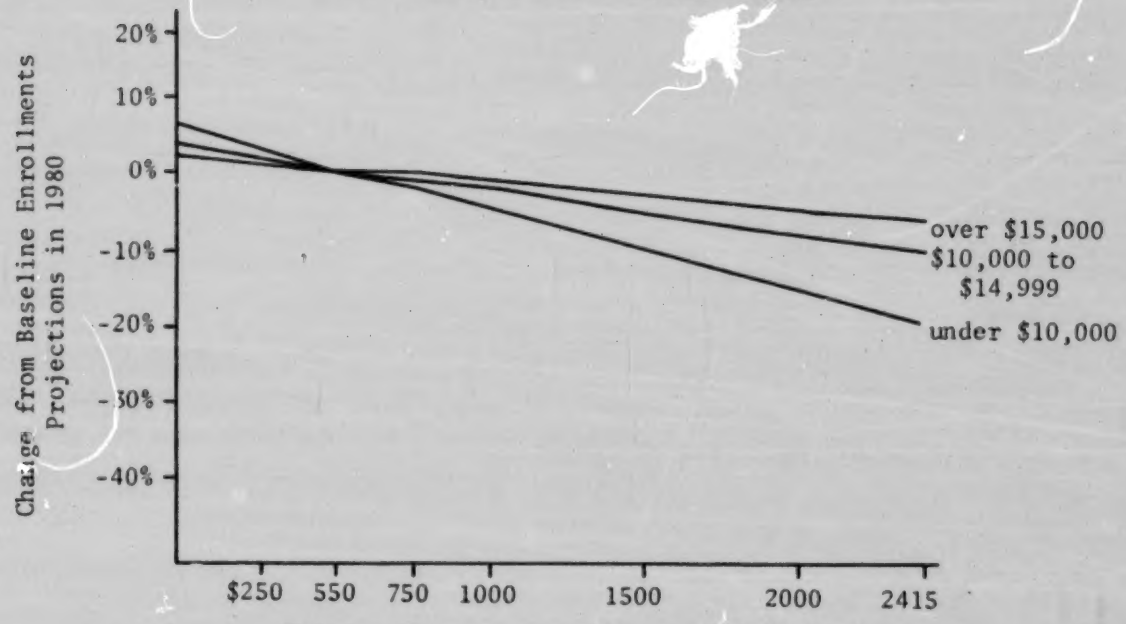
2. *Increases in the effective price (tuition minus student aid) of postsecondary education--the price the student must pay--result in decreases in enrollment; conversely, decreases in the effective price result in increases in enrollment.*

To consumers and economists, a change in the price of goods or services affects the consumption of those goods or services inversely. That is, when the price is increased, consumption will decrease; when the price is decreased, consumption will increase. The same principle holds true with respect to the cost of postsecondary education.

What is of interest, then, to those making policy and pricing decisions at the national, state, and institutional levels is how students will respond to a change in tuition. Empirical studies have shown that the amount of change in enrollment caused by a change in tuition probably varies from 1 to 3 percent for every $100 change in tuition, depending on the type of institution, the family income of the student, and the amount of tuition charged by other institutions.

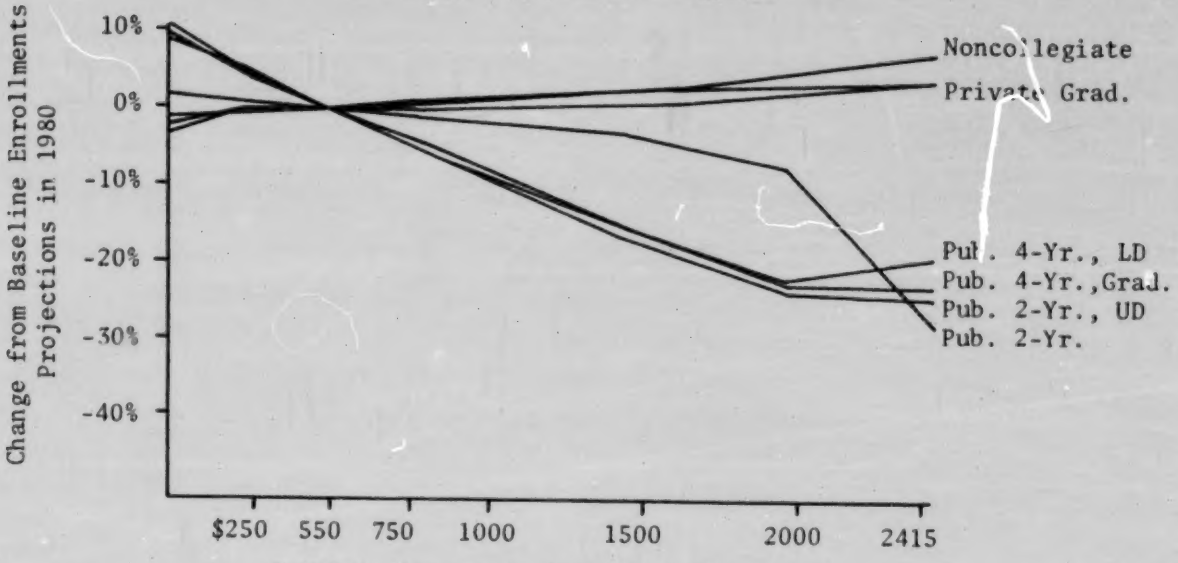
Figures B and C present estimates of enrollment changes, by type of institution and by income level, that would result if tuition at public institutions were varied from $0 per student to $2,500 per student. Under the extrapolated 1972 financing patterns, the average public tuition level is estimated to be approximately $550 per student in 1980, taking inflation into account. For calculating the changes shown in Figure B, the extrapolated 1972 financing patterns were assumed, and tuition and fees in the private sector were projected to increase at the rate of inflation. Several important observations may be drawn from Figures B and C:

Figure B: The Impact of Tuition Changes on Enrollment in 1980 by Student Income Levels



(Assumes $1.2 billion in Federal Student Education Opportunity Grants)

Figure C: The Impact of Tuition Changes on Enrollment in 1980 by Type of Institution



(Assumes $1.2 billion in Federal Student Education Opportunity Grants)

- For almost all ranges of increased tuition, students in public four-year institutions are more responsive to tuition changes than students in public two-year colleges. This finding primarily reflects the income distribution of those students. Data presented in Chapter 4 of Financing Postsecondary Education in the United States indicate that public four-year institutions enroll a larger percentage of undergraduates from families with annual incomes under $10,000 than do public two-year institutions. For the same proportionate increase in tuition, the absolute increase in tuition in four-year institutions would be greater than the absolute increase in tuition in two-year institutions, because the four-year institutions currently have higher tuition than do the two-year institutions.

- If tuition were increased and student aid held constant, low-income students would drop out at a much faster pace than middle- and upper-income students. As tuition increased, low-income students would require inceases in student aid for the payment of tuition and living costs. Without concurrent increases in student aid to offset tuition increases, low-income student enrollments would decline.

- An increase in tuition for public institutions would decrease public enrollments and increase private and noncollegiate enrollments. This result is due to the increased attractiveness of private and noncollegiate institutions, which would lead some students to switch from public to private institutions.

- The magnitude of the effects of changes in tuition on public enrollments is substantially greater than it is on private or noncollegiate enrollments. If other policy variables, such as student aid, were held constant, the effect of increasing tuition at public institutions would be to reduce total enrollments in postsecondary education; the effect of decreasing such tuition would be to increase total enrollments.

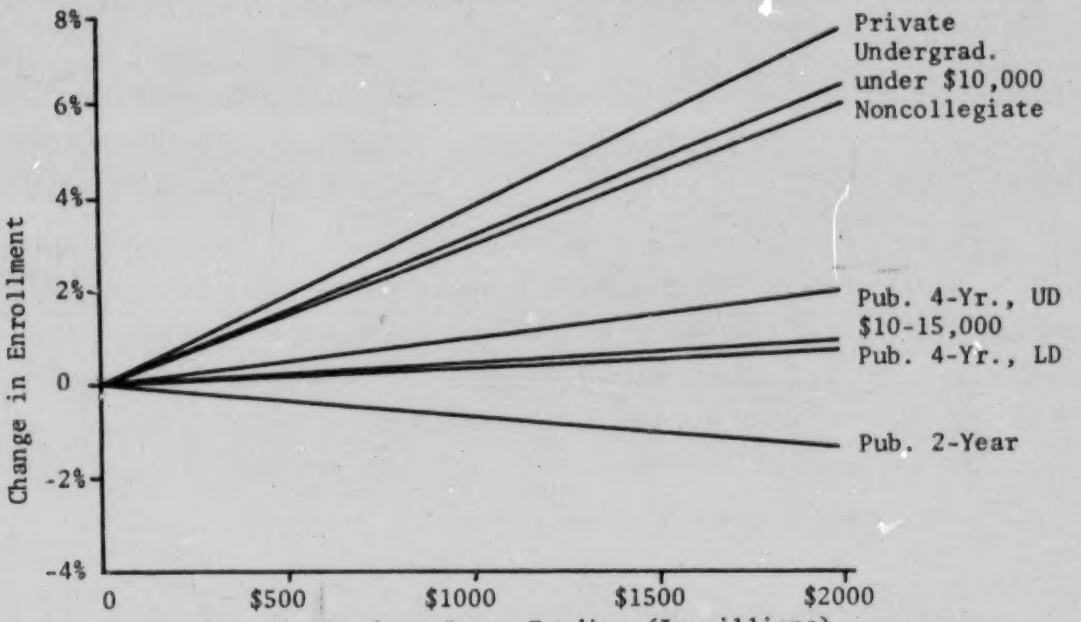
3. *Increased spending for student grants, if the extrapolated 1972 patterns of financing and enrollment continue, would result in proportionately larger increases in enrollments in the private collegiate and noncollegiate institutions than in the public sector, and enrollments in the public two-year colleges would not grow as much as would otherwise be expected.*

Figure D presents the estimated changes in student enrollments in 1980 if: (1) tuition in all sectors were adjusted only for price inflation; (2) other 1972 financing programs were to continue according to trends; and (3) variations in additional student-grant financing were to range from $0 to $2.0 billion per year. The NCES enrollment projections used in this analysis are based on the implicit assumption that federal and state student grants will continue at their present level of support.

The following observations may be made from Figure D:

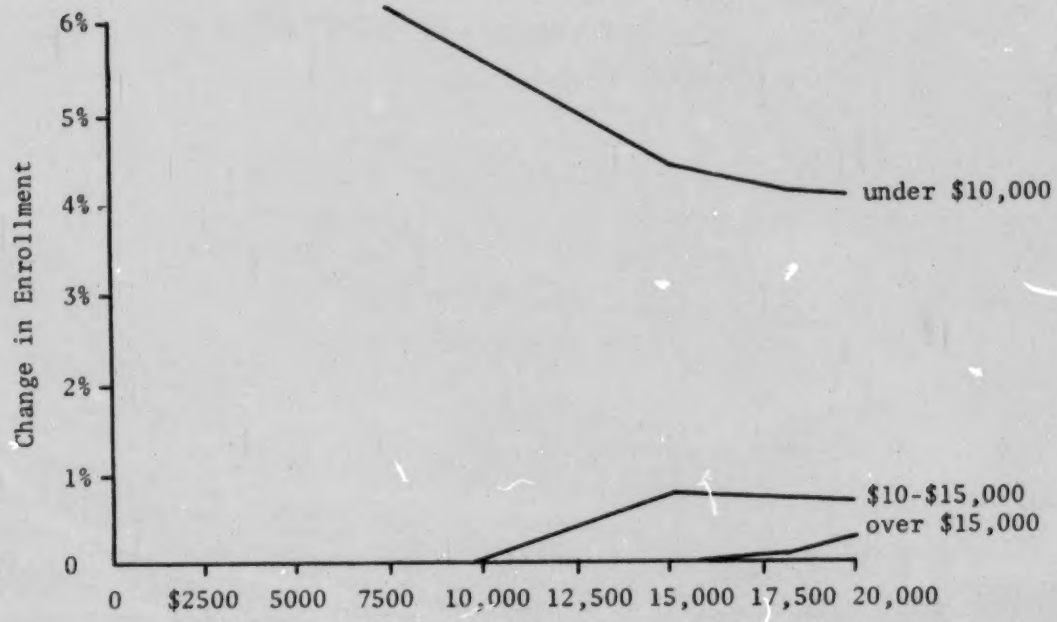
- Enrollment in all institutions except public two-year colleges would increase with increasing levels of student-grant support. The public two-year college enrollments would decline for the following reasons: (1) because public two-year colleges charge low tuition, their students would receive smaller increases in grants than students at any other institutional type; and (2) because increases in the student grants obtainable at other types of institutions would be larger than grants available at public two-year colleges, the attractiveness of attending two-year colleges would decrease. An increase of $2 billion in student aid would therefore result in 1980 in a decline (about one percent) of enrollments in public two-year institutions.
- Enrollments in the private collegiate and noncollegiate sectors would increase about four times as fast as in the public four-year institutions, because students enrolled in private collegiate and noncollegiate institutions would receive larger increases in grants than students enrolled in the public four-year institutions. With a maximum family income ceiling of $15,000 for eligibility,

Figure D: The Impact of Student Aid Funding Changes on Enrollment in 1980 by Student Income Level and Type of Institution



(Assumes current tuition levels adjusted only for price inflation)

Figure E: The Impact of Changes in Student Aid Maximum Income Eligibility on Enrollment in 1980 by Student Income Level



(Assumes $1.2 billion in Federal Basic Education Opportunity Grants)

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nearly all of the enrollment increases would come from students from families with incomes of less than $10,000.

4. *If the income eligibility ceiling for student grants were changed from $15,000 to a lower level, the enrollment of students in the $10,000 to $15,000 range would decrease slightly while the enrollments of students in the under $10,000 family-income group would increase.*

Figure E presents the percentage change in total enrollments in all types of institutions resulting from a change in the maximum income eligibility ceiling from $7,500 to $20,000; stabilizing tuition in all sectors, except for inflation; and assuming that financing for Basic Educational Opportunity Grants reaches $1.2 billion by 1980.

The following observations may be made from Figure E:

- As the maximum income eligibility ceiling ranges from $7,500 to $15,000, the percentage increase in enrollments of students from families earning less than $10,000 moves downward from about 6 percent to about 4 percent.
- As the maximum income eligibility ceiling ranges from $15,000 to $20,000, there would be little effect on the enrollment of individuals from low-income families (that is, under $10,000) or from upper-income families (over $15,000).

The reasons for these results are that the needs criteria for distributing the Basic Educational Opportunity Grant monies limit middle-income students to relatively small grants and students from low-income families respond more to the same dollar value of student grants than do students from middle- and upper-income families.

5. *Expanding student access to postsecondary education through increased student grant financing would require institutions to seek supplemental financial assistance to meet additional costs induced by the enrollment growth.*

Expanding access to postsecondary education through increased student grant financing would probably result in the increases in enrollments already discussed above. Assuming that public and private

institutions would respond to the additional student demand for enrollment brought about by increasing student aid, and recognizing that income from student tuition and other fees covers only a portion of the costs of instruction, it is evident that the institutions would require additional financial support to provide for the additional students.

Table 21 presents an estimate of the additional financial support needed in 1980 by each institutional type, assuming $1.2 billion were made available in student grants. Because of changes in the patterns of enrollment, tuition, and costs of instruction, public two-year institutions would require $36 million less in operating expenses because their enrollments would decline with additional student grants. Public four-year and private collegiate institutions would need additional support of $87 million and $119 million, respectively, because their enrollments would increase with additional student grants.

The additional financial support needed by these institutions could be provided in many ways. If this additional financial support was provided by capitation grants based on total undergraduate enrollment, an amount of $24 per undergraduate student in public four-year institutions and $69 per undergraduate student in private institutions would be needed to cover the extra cost induced by additional enrollment in these sectors. If this additional support was provided by supplemental grants, an amount of $37 per undergraduate student aided in public four-year institutions and $120 per undergraduate student aided in private institutions would be needed to cover the extra cost induced by additional enrollment in these sectors.

The magnitude of these institutional supplements is smaller than many people expected in light of the average costs of instruction, which will probably be on the order of $2,000 to $3,000 per undergraduate in 1980. It is very easy, however, to confuse the average cost of additional student with a purely constructed number that would provide enough money to institutions to cover their extra costs induced by increased student access. This number could be constructed on the basis of undergraduate enrollment or the number of students receiving grant-in-aid assistance

Table 21: Impact of Changes in Student Aid Financing and Enrollment on Institutional Resource Requirements* in 1980, by Type of Institution

Enrollment and Cost Changes	Institutional Sector			
	Public 2-Year	Public 4-Year	Private	Noncollegiate
Resultant undergraduate (UG) enrollment induced by increases in student aid grants.....	2,120,909	3,628,060	1,728,708	1,910,435
Percent of undergraduate students eligible for student aid.....	N/A	46.4%	57.6%	76.1%
Change in financial resource requirements (net of changes in tuition revenue).....	-$36,368,245	$86,761,303	$119,162,689	0
Alternative institutional resource requirements**				
Per UG student (Capitation Grants).....	0	$24	$69	0
Per UG student aided (Supplemental Grants).	0	$37	$120	0

*As institutions accommodate extra students, they also incur extra costs, even above and beyond the additional tuition revenues brought in by the extra students. But the average cost of additional student should not be confused with a purely constructed number that would provide enough money to institutions to cover their extra costs induced by increased access. This number could be constructed on the basis of undergraduate enrollment or the number of students receiving grants-in-aid assistance or on another basis.

**Based on the number of students aided, not on marginal (newly added) students.

or on another basis. Consistent with the previous observation, individuals are not all that responsive to increases in student grants; an additional $1.2 billion in 1980 would increase enrollment in 1980 by an estimated 2 percent. The additional costs not covered by net tuition receipts from this additional enrollment is a small amount when spread over all undergraduates or even when spread over those students eligible for, and presumably receiving, the additional student grants.

Conclusions

The Commission concluded that an analytical framework, similar to that described in this paper and in Chapter 6 of Financing Postsecondary Education in the United States provides an instrument that can significantly improve the capacity of policy makers to make decisions about the financing of postsecondary education.

However, such frameworks are difficult to develop, as demonstrated by the limitations of the analytical model, one element of the framework. For although the analytical model provides useful estimates with respect to student response to pricing decisions, the model does not, because of deficiencies, estimate institutional responses to a variety of financing mechanisms designed to aid institutions.

Recommendation

The Commission strongly recommended further research on, and development of, analytical frameworks and models similar to those used by the Commission. The Commission also recommended further collection and analysis of data which, although currently not available, would be useful for the evaluation of the impact of major financing alternatives on the achievement of national objectives, particularly objectives related to institutions, such as diversity and excellence.

5. FUTURE RESEARCH DIRECTIONS

CHAPTER 5.

FUTURE RESEARCH DIRECTIONS

One of the findings of almost every research effort is that more research is needed--and this is clearly the case with the rudimentary data base and policy analysis model described in this report. The data base was assembled and the analytical model constructed in response to the particular problems faced by the National Commission. There is no assertion that the data base and the model are appropriate for all policy questions. However, we believe that the data base assembled by the Commission will be useful for policy analysis in the future and; for that reason, it should be maintained and made generally available to analysts in all levels of government and in institutions and private organizations. As indicated previously, the data base should be viewed as a creature standing on the threshold, at a point of departure, rather than an ultimate oracle; it is currently more the creature of what was possible and what data was available in 1973 than a prophet and creator of desirable data.

The analysis performed by the model is based on the best data available, but the data leave a great deal to be desired with respect to accuracy, consistency, and completeness. Data sources may be categorized as: (a) student demand data; (b) institutional program data; and (c) data describing relationships among the decisions of different sources of financing.

National data on student demand for postsecondary education and on demand changes in response to financing policies are extremely limited. While information on student enrollment responses to changes in student grants or tuition is available, the absence of a large-scale longitudinal study of individual choices and participation in postsecondary education makes it impossible to determine other important relationships relative to student demand and financing policies, including the impact of changes in student loans, work-study, income contingent loans, or other forms of student aid. Although the analysis focused on

student grants allocated according to family income, it could have incorporated merit-based student aid and financial need based on student income, if adequate information had been available.

Data on either changes in institutional program offerings that relate to the objectives of excellence and diversity or changes in institutional behavior that relate to objectives of independence and accountability are currently nonexistent. The analytical model provides a means for estimating how much additional money a particular financing plan would provide to institutions and how much the plan would induce in savings or costs.* Because of the lack of appropriate data, however, the model does not produce information about what the institutions would be likely to do with the additional support or about its likely impact on the objectives. This major limitation must be kept in mind when considering the usefulness of the information produced by the analysis.[6]

Because data describing the relationships between and among the decisions of different sources of financing do not exist, the analysis is also unable to take into account the possible interaction among the financing decisions of the different sources of financial support--for example, the possible reductions in state support as federal support is increased.

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*This information is useful in making informed judgments about the effects of a financing plan on the objectives of excellence and diversity, and to some extent, independence.

[6]The reader may find these publications by the National Center for Higher Education Management Systems (Boulder, Colorado) useful: Vaughn Huckfeldt, A Federal Planning Model for Analysis of Accessibility to Higher Education: An Overview (1973); Vaughn Huckfeldt, George Weathersby, and Wayne Kirschling, A Design for A Federal Planning Model for Analysis of Accessibility to Higher Education (1973); Kent Weldon and Vaughn Huckfeldt, Prototype Software for A Federal Planning Model for Analysis of Accessibility to Higher Education (1973); Kent Weldon and Vaughn Huckfeldt, Preliminary Operating Instructions for a Federal Planning Model for Analysis of Accessibility to Higher Education (1973); Vaughn Huckfeldt, Preliminary Test Reports from a Federal Planning Model for Analysis of Accessibility to Higher Education (1973); Vaughn Huckfeldt, Preliminary Data for a Federal Planning Model for Analysis of Accessibility to Higher Education (1973).

The data exclude expenditures that go to institutions, agencies, and organizations outside the scope of postsecondary education but that may, nevertheless, have an important impact on objectives. For example, support for special secondary school counseling for low-income and inner-city secondary school students may have as much or more impact on access as a comparable amount spent for student financial aid. Similarly, support for supplementary forms of transportation for inner-city residents who are not well served by existing public transportation may also have an important effect on access and choice. It does not seem useful at this stage to develop an expanded taxonomy, however, because the range of both services and forms of expenditure is so great.

The data and model also did not take into account state and regional differences. The analytical framework and model can, however, when and if appropriate regional data become available, be used to take such differences into account. Such a research tool would be particularly relevant for state level decision making in postsecondary education.

As discussed in Chapter 3 (in the section on assumptions), the model is also limited by design and/or exclusions. Some important interrelationships among the demand, supply, and financing aspects of postsecondary education that should be considered in this model are not now included because the theory or the data do not exist. Hopefully, this model or other similar models will incorporate these relationships as they are developed.

In addition, conscious decisions were made to exclude some variables which, at this time, seemed to be comparatively less important than those variables included. For example, construction costs were not included because as institutions near the peak of their growth curve, new construction is not likely, in most cases, to be started.

Clearly, policy makers must be aware of the limitations of any model. In spite of the limitations outlined above, the analytical model used by the Commission has produced useful information that can assist policy makers in their evaluation of alternative financing

plans. Moreover, these limitations provide an agenda for future research. The analytical framework can be used to determine where new information, theory, or analysis is needed.

Our basic philosophy is that if policy analysis is to be relevant it must be based on real policy decisions.* The data base and analytical model described in this report are one response to the national policy concerns that the Commission foresaw for the near future. As the future policy questions come into sharper focus, new data and analyses will undoubtedly be needed. If basic theoretical constructs, data collection systems, and analytical capabilities are in existence, policy analysts will be able to respond effectively to these policy questions.

*An interesting example of policy analysis using an approach conceptually similar to the Commission's framework is described in Arthur D. Little, "College Endowment Funding Program," Cambridge, 1973.

6. Conclusions

CHAPTER 6.

CONCLUSIONS

This paper has described in detail the Commission's framework and model for the quantitative analysis of alternative financing proposals for postsecondary education. To conclude, this section discusses several advantages of using such an analytical framework and model and suggests some of the areas that need additional research and development.

The National Commission built its policy analysis around an analytical framework, utilizing and organizing available data and research results as much as possible. This comprehensive, analytical approach to policy analysis, including the development of an analytical model, has several advantages:

1. Requires stating financing policies concisely. Evaluating the impact of a financing proposal for postsecondary education requires it to be translated into concise, quantitative statements before a model can be used. Any difficulties in translating some portions of a financing plan into quantitative statements for the model serve to highlight the areas where the plan needs to be more specific.

2. Provides common grounds for comparisons. All policy alternatives are evaluated using (a) the same structure, (b) the same set of assumptions about important factors encompassing the postsecondary education enterprise; and (c) the same information base about students, institutions, and financing sources. Thus, the differences in the estimated impacts revealed by the analysis are due to the different financing mechanisms and levels of support rather than to the different assumptions underlying each financing proposal.

3. Interacts with participants. Construction of a model forces one to think through the various interactions of all the participants in postsecondary education (institutions, students, and governmental units). Not only must these interactions be identified, but, wherever

possible, quantitative estimates of the interactions should be included in the model.

4. Identifies gaps in data collection. Constructing such an analytical model requires assembling and linking together all of the relevant data currently available on the various aspects of postsecondary education. This process not only maximizes the utility of current data but also identifies gaps in the information and data.

5. Correlates research studies. Constructing an analytical model also integrates relevant research studies that have dealt with one or several of the behavioral relationships needed in the model. Examining research studies in this light provides a policy perspective for the various research efforts currently under way and also identifies areas where more research is needed.

6. Calculates policy impacts. The model developed by the Commission analyzes the impact of marginal changes in either the level of financing or the financing delivery mechanism (or both) on the achievement of selected objectives for postsecondary education while other factors are held constant.

7. Aids development of financing alternatives. In addition to determining the impacts of current financing proposals, a model and an analytical framework can be used as a tool to aid in constructing a specific financing package that will effectively achieve certain national objectives. The model the Commission used was designed in such a way that an analyst could interact quickly with the model to test many alternatives.

In developing this analytical model, the staff recognized that several components of the model were based on incomplete information and inadequate knowledge about the interrelationships between changes in financing and the responses of students, institutions, and sources of financing. Given the time constraints imposed upon the Commission's work, the staff was not able to undertake additional data collection or perform additional research in these areas, which still remain for exploration. These additional topics include:

1. Estimates of price response coefficients.
2. Design of the model to allow for more flexibility in specifying the financing alternatives.
3. Design of the model to calculate and report additional impact measures of the accomplishment of objectives.
4. Estimates of marginal costs of additional students in various types of institutions.
5. Reaction of admission policy decisions and other administrative decisions by various types of institutions to new Federal and state student and institutional aid programs.
6. Reaction of states and local governments' financing decisions to Federal financing policies.
7. Information on noncollegiate institutions.

In addition to providing a consistent framework for the Commission's evaluation of policy alternatives, the basic analytical framework and model, it is hoped, will provide a reference point for continuing research into the many dimensions of postsecondary education. The comprehensive and policy-based design of the model, in our opinion, provides effective means of integrating the research currently in progress with the needs of national policy makers.

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APPENDIXES

Appendix A: Some Research Studies of Price Response Coefficients

Several research studies have recently presented empirical estimates of the price response of (potential) students attending postsecondary education institutions. These studies have followed widely different methodological approaches to making such estimates and have utilized a large variety of data sources. It is encouraging that the results appear to be consistent across the studies. Five of these research studies are briefly described--in the researchers' own words--in this Appendix; then, some conclusions are drawn about the empirical results of the price response coefficient estimates.

Radner-Miller Study[1]:

> "Our approach to the estimation of the demand for places in institutions of higher education has thus far focused on the decisions by individual graduating high school seniors between going and not going on to college, and their choices among available institutions, or institution-types.
>
> "Our statistical model is designed to relate the relative frequencies of choices to the characteristics of the individual student and his alternatives. For actual estimation purposes we have available data for a sample of students included in the SCOPE[2] study. The availability of data and the results of experiments with different formulations led us to concentrate on the following variables (whose precise definitions are given below):
>
> A_i an ability score for student i
>
> I_i a measure of income for student i
>
> S_j a measure of the 'selectivity' or 'quality' of alternative j
>
> C_{ij} the out-of-pocket dollar cost to i of going to j (set equal to zero for the alternative 'no school')

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1 R. Radner and L. Miller, "Demand and Supply in U.S. Higher Education: A Progress Report", American Economic Review, May 1970.

2 SCOPE (School to College: Opportunities for Postsecondary Education), Center for Research and Development in Higher Education, University of California, Berkeley.

"We assume that the probability that student i chooses alternative j is a function of these variables, and the set of alternatives open to i, which we shall denote by J_i. We assume further that this functional relationship can be expressed in terms of two intermediary variables. . .

$$X_{ij} = \frac{{}_i S_j}{1000} \quad , \quad Y_{ij} = \frac{C_{ij}}{I_i}$$

"The particular functional relationship is a generalized form of logit analysis. For each i and j, define f_{ij} and F_{ij} by:

$$f_{ij} = aX_{ij} + bY_{ij}$$

$$F_{ij} = e^{fij}$$

where a and b are parameters to be estimated. The conditional probability, P_{ik}, that student i chooses alternative k from the set J_i of alternatives open to him, given the values of the variables X_{ij} and Y_{ij} is assumed to be determined by the equation:

$$P_{ik} = \frac{F_{ik}}{\sum_{j \in J_i} F_{ik}}$$

"Note that this implies that the "odds" for any pair of alternatives, j and k, are equal to the ratio (F_{ij} / F_{ik}), and the logarithm (to the base e) of these odds is equal to $(f_{ij} - f_{ik})$ or a $(X_{ij} - X_{ik}) + b(Y_{ij} - Y_{ik})$. The method of estimating the parameters a and b from data on a sample of students i is due to McFadden.[3]"

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[3] D. McFadden, "The Revealed Preferences of a Government Bureaucracy", Technical Report #17, Project for the Evaluation and Optimization of Economic Growth, Department of Economics, University of California, Berkeley, November 1968.

Kohn-Manski-Mundel Study[4]:

"Behaviorally, we assume that each college, in a given year, offers admissions to students who rank high, academically, relative to its pool of applicants and awards financial aid to those who rank high academically and low in income relative to the pool of accepted students. Behaviorally, we assume the student is a utility maximizer. The value of a student's utility index for a given college is determined by three factors, the perceived benefits of the alternative, its perceived costs, and the student's 'propensity for higher education.' Our specification recognizes the dual nature of college as both consumption and investment goods, the particular problems posed by the rationing of educational loans, and the possibility that tastes for college may vary with the student's background.

"First, we estimated college behavior equations yielding a probability of admission and a distribution of financial aid awards for any student. Then, given a sample of students whose college going decisions have been observed, we generate sets of feasible alternatives. Finally, estimation of the student behavioral model follows the usual economic practice of interpreting actual choices as revealing the preferences of the decision maker.

"Primary data sources for the study are the SCOPE survey of high school seniors and the American Council on Education's Institutional Research File on American Colleges."

Tables A-1 and A-2 present the results of the estimation undertaken by this survey.

Barnes-Erickson-Hill-Winokur Study[5]:

".....the price coefficients summarize the estimated relationship between college prices and student enrollment decisions. These estimates are different for each of four income groups. They are derived from a demand model which estimates the probability that an eligible high school graduate will continue to college as a function of the prices of attending a private option, a public 4 year option and a public 2 year option. Another part of the demand model estimates the probability that a student who has decided to continue on to

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4 M. Kohn, C. Manski, and D. Mundel, "A Study of College Choice," presented at the Winter Meeting of the Economic Society, Toronto, Canada, December 1972.

5 G. Barnes, E. Erickson, W. Hill, Jr., and H. Winokur, Jr., "Further Analysis of the College Going, College Choice Model", ICF Incorporated, December 1972.

college will choose a private institution. The college choice model is taken to be a function of the same set of prices as the college going model. These price response parameters have been estimated from survey data on the 1970 class of graduating high school seniors in North Carolina.

"The separate sensitivity tests performed on the college going/college choice analysis fall into three major areas:

--the realistic definition and measurement of alternative option prices,

--the definition and measurement of other variables such as travel costs, ability, etc., and

--the statistical form for estimation of the model.

"In general, the conclusion we draw from the sensitivity analysis is that the college going/college choice model is quite robust.

"We conclude two things from these results:

1. Students respond to the present value of the interest subsidy of loans in essentially the same way that they respond to scholarship and employment aid.

2. Inclusion of the present value of the interest subsidy of loans consistently improves the explanatory power of the estimations.

"We conclude that our results are not seriously affected by whether gross option prices are measured as full student budgets or as tuition and fees alone. The model is robust in terms of its ability to generate consistent results using alternative, but well defined, measures of option prices. What is important is that the measures of gross option prices be systematic (in the sense that there is a firmly established conversion formula to translate one measure into any other) and that student financial aid be included in the measures of net option prices.

"In general, the results are better (but not significantly different) when the ability measure is redefined as simple high school grade point average. This is good news. SAT or ACT scores are not available for many students. The calculation of inverted rank score is complicated and uses a great deal of computer core. Students' GPA's are readily available and more reliably self-reported than the rank in class. Therefore, the ability to use GPA without imparing our results (and perhaps marginally improving them) makes the extension of the college going/college choice analysis to other states more feasible."

Table A-1: The Model of Choice Among Colleges

Variable	Range of Values	Coefficient	Standard Error
Average Student Ability (average SAT score)	200-800	.00316	.000583
Ability Spread (average SAT-student SAT)^2	0-3600	-.0000384	.00000305
College Affluence (revenues per student)	1000-4000 (approx.)	.000329	.0000221
Breadth of Offerings (an index)	1-13	-.180	.00871
Distance (miles)	0-200	-.0287	.00563
Consumption Drain [(tuition-scholarship)/income]	0-1 (approx.)	-.138	.0718
Coed College	0-1	1.273	.106
University	0-1	-2.685	.216
Four-Year College	0-1	1.128	.0842
Dorm Capacity (percent)	0-100	-.0403	.00108

SOURCE: M. Kohn, C. Manski, and D. Mundel, "A Study of College Choice," presented at the Winter Meeting of the Economic Society, Toronto, Canada, December 1972.

Table A-2: The Go-No Go Model

Variable	Range of Values	Coefficient	Standard Error
Relative Utility of Best College Alternative (index using coefficients in Table A-1)	-3 - +3	.670	.0255
Student Sex (1 if female)	0-1	-.311	.0572
Father's Education:			
less than six years	0-1	.575	.215
six years	0-1	.533	.178
some high school	0-1	.623	.170
finished high school	0-1	1.047	.165
some college	0-1	1.309	.169
bachelor's degree	0-1	1.644	.195
master's degree	0-1	1.925	.242
doctoral degree	0-1	1.823	.287
Mother's Education:			
less than six years	0-1	-.596	.289
six years	0-1	.123	.210
some high school	0-1	.0926	.199
finished high school	0-1	.420	.194
some college	0-1	1.102	.202
bachelor's degree	0-1	1.218	.231
master's degree	0-1	1.178	.322
doctoral degree	0-1	.461	.679
Parental Income (dollars)	0-30000 (approx.)	.0000287	.00000763
Constant	1	-3.611	.206

SOURCE: M. Kohn, C. Manski, and D. Mundel, "A Study of College Choice," presented at the Winter Meeting of the Economic Society, Toronto, Canada, December 1972.

Corrazzini-Dugan-Grabowski Study[6]:

"Based upon human capital theory, an enrollment model for higher education is formulated with demand being subject to nonprice rationing by academic admission standards. Cross-sectional differences in student enrollment are related to variables representing both demand factors and supply-side constraints. Two questionnaire surveys - Project Talent's national cross-sectional sample in the early 1960s and a recent survey of 4,000 high school seniors in the Boston SMSA - provide sufficient data to test the theoretical hypothesis derived. At both levels of aggregation, strong structural relationships between college attendance and socioeconomic status emerge. Stratifying the on-going group by socioeconomic quartiles yields insights into the distributional aspects of higher education enrollment.

"Considering the total enrollment function first, it is clear that tuition and unemployment, empirical counterparts of the price variable, are statistically significant determinants of total enrollment. The total enrollment rate is most responsive to tuition charges at four-year public universities, and a decrease of $100 in tuition in 1963 is associated with a 2.65 percent increase in the nation's enrollment, based upon these cross-section results. Junior college and private university tuition rates are also significant, but the magnitude of their impact upon enrollment is less than one-half that of tuition at four-year universities."

Table A-3 presents the regression results of higher education enrollment rates performed in this study.

Hoenack-Weiler Study[7]:

"This paper analyzes the effects of cost-related tuition policies on the size and composition of enrollments and associated revenues and costs at the University of Minnesota. It presents evidence that the University can differentiate tuition charges according to instructional costs without reducing either aggregate enrollments or revenues and, in fact, possibly increase both. This evidence is based on instructional cost information and time series multiple regression analysis of enrollment demand behavior

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6 A. Corrazzini, D. Dugan, H. Grabowski, "Determinants and Distributional Aspects of Enrollment in U.S. Higher Education," The Journal of Human Resources, VII, 1.

7 S. Hoenack and W. Weiler, "Cost-Related Tuition Policies and University Enrollments," Management Information Division, Office of Management Planning and Information Service, University of Minnesota, December 1973.

Table A-3: Regression Results of Higher Education Enrollment Rates (In Percent Terms) of 1960 Tenth Graders: Total and by Socioeconomic Quartiles

Percent Enrolled	Constant	T_j	T_u	T_c	T_p	W	U	F	A	$\bar{R}^2$
E_T	14.43	-.011	-.027	-.005	-.009	-3.62	.834	2.84	.176	.769
		(3.14)**	(2.32)*	(1.26)	(2.06)*	(1.03)	(2.04)*	(4.21)**	(5.72)**	
E_{1SES}	6.29	-.028	-.050	-.024	.007	-5.39	3.104	5.07	.164	.537
		(2.06)*	(1.71)*	(1.04)	(0.57)	(2.29)*	(1.34)	(2.52)**	(1.56)	
E_{2SES}	16.62	-.037	-.055	.029	-.006	-6.36	1.264	3.41	.212	.412
		(1.49)	(1.81)*	(0.96)	(1.09)	(1.08)	(1.22)	(2.17)*	(2.02)*	
E_{3SES}	23.65	-.021	-.039	-.007	-.018	-4.01	-1.260	3.63	.276	.450
		(1.19)	(1.19)*	(1.36)	(1.74)*	(0.96)	(0.58)	(2.08)*	(2.12)*	
E_{HSES}	22.36	.002	-.050	.002	-.016	2.75	-.260	1.07	.180	.491
		(0.57)	(1.68)*	(0.86)	(2.09)*	(0.54)	(1.89)*	(1.21)	(2.23)*	

NOTATION: t-statistics are in parentheses.* = statistically significant at the 5 percent level (one-tailed test);** = statistically significant at the 1 percent level (one-tailed test).

$\bar{R}^2$ = coefficient of determination adjusted for degree of freedom; E_T = total enrollment rate in college of 1960 10th graders (in percent); E_{1SES} = enrollment rate of low socioeconomic quartile; E_{2SES} = enrollment rate of second quartile; E_{3SES} = employment rate of third quartile; E_{HSES} = enrollment rate of high socioeconomic quartile; T_j = tuition at junior colleges; T_u = tuition at four-year public universities; T_c = tuition at teacher colleges; T_p = tuition at four-year private universities; W = average hourly earnings of production workers; U = unemployment rate; F = paternal education ranked by educational attainment groups of 0-7 years, 8 years, 1-3 years of high school, high school degree, 1-3 years of college, college degree, 5+ years of college; A = performance on Project Talent achievement tests.

SOURCE: A. Corrazzini, D. Dugan, and H. Grabowski, "Determinants and Distributional Aspects of Enrollment in U.S. Higher Education," The Journal of Human Resources, VII, 1. p. 46.

developed for the University.

"All coefficients are significant at the 5% level in each equation. Along with the negative partial derivatives of the dependent variables with respect to tuition, another interesting result is that the coefficients of the interaction terms in each equation have negative signs. If we write the regression equation used for each unit as

$$A = b_o + b_1 \ln Y + b_2 \ln T + b_3 (\ln Y * \ln T),$$

where A = ratio of enrollment to eligible, high school graduates,

T = tuition, fees, and room and board, and

Y = per capita Minnesota real income

then,

$$2A/2T = \frac{1}{T} (b_2 + b_3 \ln Y) \text{ and}$$

$$\frac{(2A)^2}{2T2Y} = b_3 (1/TY)$$

"This latter partial derivative describes how the sensitivity of attendance rates to tuition varies with average income levels. A negative sign for b_3 is thus interpreted as meaning that the sensitivity of average individual attendance response to changes in tuition decreases as average income levels increase; this was the result we expected for each unit."

Table A-4 presents the results of the estimation performed in this study.

Summary of Price Response Studies

These five studies indicate that the proportion of the eligible population attending college or that the probability an individual attends college increases with family income and decreases with the cost of attendance (defined in a variety of ways). The results are also consistent in that these price and income effects are significantly different from zero statistically.

It is difficult, unfortunately, to compare the magnitude of the price and income effects across the different studies. Since the price

Table A-4: Initial Student Attendance

Dependent Variables: Ratio of Freshmen Enrollments from Minnesota to Total Minnesota High School Graduates Eligible for Enrollment in College Listed: 1948-1972[a]

Independent Variables	College of Liberal Arts	Institute of Technology	Agriculture Forestry and Home Economics	General College
Log Income (Constant $)	4.023	1.054	0.326	1.509
	(3.91)[b]	(3.16)	(2.67)	(5.63)
Log Tuition (Constant $)	3.987	1.143	0.344	1.616
	(3.07)	(3.40)	(2.77)	(5.98)
Product of Log Income and Log Tuition	-0.544	-0.153	-0.0466	-0.217
	(-3.10)	(-3.29)	(-2.72)	(-5.81)
Constant	-28.824	-7.851	-2.391	-11.219
	(-3.17)	(-3.26)	(-2.69)	(-5.80)
R^2 (Adjusted for degrees of freedom)	.665	.477	.256	.656
Durbin-Watson Statistic	0.83	1.03	1.85	1.38
Partial Derivative of the Dependent Variable with Respect to Tuition[c]	-0.000262	-0.0000261	-0.0000121	-0.0000423
Tuition Elasticity[d]	-1.286	-0.837	-0.533	-1.811

SOURCE: R. Boenack and W. Weiler, "Cost-Related Tuition Policies and University Enrollments," Management Information Division, Office of Management Planning and Information Services, University of Minnesota, December 5, 1973, p.19.

[a]The sample size is 25 for each regression.

[b]The t- statistic for each coefficient is shown immediately beneath the the estimated coefficient. The 1% significance level is 2.83 and the 5% level is 2.08 for each equation.

[c]These derivatives are evaluated at the mean values of the independent variables.

[d]Elasticities are evaluated for a $1 increase in tuition from the current level.

and income response coefficients are derived from partial derivatives of the various regression equations, the calculation of comparable coefficients requires calculating the ratio of the partial derivatives to the dependent variables. Usually, not enough information is provided in the studies to enable these calculations to be made. Some rough calculations indicate that the price response coefficients range between one and five percent for a $100 change in price. That is, if tuition decreases by $100, then enrollment would increase by one to five percent, depending on the type of institution and on the income level of the particular population segment.

Although many postsecondary education financing policies deal primarily with tuition and student aid changes, the results of the studies outlined do not provide a complete framework in which to evaluate alternative policies. These studies provide no means of tracing through the impacts of the policies on the institutions. Since most student-oriented financing policies are designed to stimulate enrollment, some means of determining whether or not the institutions can support these enrollment changes are needed. Also, the total costs of the particular policies to the public may be much greater than originally thought, if the additional revenues required by the institutions are included. For these reasons, any comprehensive analysis of postsecondary education financing alternatives requires both student and institutional components. The National Commission's model was designed to include the behavior of both these components.

Appendix B: File Directory for the NCFPE National Postsecondary Education Data Base

	File	Contents	Status
(1)	CALVERT	Office of Education, Vocational Education Directory Survey, 1970-71 (347 variables, 11,731 institutions)	Public
(2)	CARNEGIE	Carnegie Commission, Survey of Private, Technical, Business, Specialized and Vocational Schools and Colleges, 1972 (158 variables, 674 institutions)	Protected
(3)	CEEBCLS	College Entrance Examination Board, College Locater Institutional File, 1972-73 (institutional characteristics, activities, programs; student characteristics) (139 variables, 2,640 institutions/ campuses)	Protected
(4)	FEDERAL	National Commission on the Financing of Postsecondary Education, Federal Program Funding data, 1971-74 (26 variables, 389 programs)	Public
(5)	ISSC	Illinois State Scholarship Commission, Survey of Financial Aid Recipients, 1970-71 (48 variables, 1,294 students)	Protected
(6)	LOCAL	NCFPE and the Bureau of the Census, Local Government Funding data, 1966-67, 1971-72 (75 variables, 403 districts)	Public
(7)	NCFPEVT	National Commission on the Financing of Postsecondary Education, Survey of Postsecondary Career Schools, 1973 (71 variables, 227 institutions)	Public

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(Appendix B, continued)

	File	Contents	Status
(8)	SRSCAPC	CEEB, College Scholarship Service, Student Resource Surveys, 1973-74, California private four-year colleges and universities (69 variables, 12,182 students)	Protected
(9)	SRSCASC	CEEB, College Scholarship Service, Student Resource Surveys, 1973-74, California state colleges and universities (69 variables, 47,252 students)	Protected
(10)	SRSCATY	CEEB, College Scholarship Service, Student Resource Surveys, 1973-74, California private two-year colleges (69 variables, 37,696 students)	Protected
(11)	SRSCAUN	CEEB, College Scholarship Service, Student Resource Surveys, 1973-74, University of California campuses (69 variables, 63,740 students)	Protected
(12)	SRSOREG	CEEB, College Scholarship Service, Student Resource Surveys, 1973-74, Oregon public and private colleges and universities (69 variables, 32,248 students)	Protected
(13)	SRSPENN	CEEB, College Scholarship Service, Student Resource Surveys, 1973-74, Pennsylvania public and private colleges and universities (69 variables, 19,793 students)	Protected
(14)	SRSWASH	CEEB, College Scholarship Service, Student Resource Surveys, 1973-74, Washington public and private colleges and universities (69 variables, 27,624 students)	Protected

(Appendix B, continued)

	File	Contents	Status
(15)	STSCHLR	State Scholarship Surveys of Financial Aid Recipients, 1971-72, for California, New Jersey, New York, and Pennsylvania (64 variables, 3,110 students)	Protected
(16)	TRINST71	Office of Education, HEGIS Surveys, 1970-71 1) Institutional characteristics 2) Opening fall enrollment 3) Finance 4) Earned degrees (637 variables, 3,265 institutions/ campuses)	Public
(17)	TRINST72	Office of Education, HEGIS Surveys, 1971-72 1) Institutional characteristics 2) Opening fall enrollment 3) Finance (278 variables, 3,407 institutions/ campuses)	Public
(18)	TRINST73	Office of Education, HEGIS Surveys, 1972-73 1) Institutional characteristics 2) Opening fall enrollment (173 variables, 3,496 institutions/ campuses)	Public
(19)	TRINST74	Office of Education, HEGIS Surveys, 1973-74 1) Institutional characteristics 2) Opening fall enrollment (29 variables, 3,014 institutions)	Public

(Appendix B, continued)

	File	Contents	Status
(20)	TRNST71B	Office of Education, HEGIS Surveys, 1970-71 1) Institutional characteristics 2) Opening fall enrollment 3) Employee (no salary data) 4) Physical facilities 5) Basic student charges (282 variables, 3,265 institutions/ campuses)	Public
(21)	TRNST72B	Office of Education, HEGIS Surveys, 1971-72 1) Institutional characteristics 2) Opening fall enrollment 3) Physical facilities 4) Basic student charges (344 variables, 3,407 institutions/ campuses)	Public
(22)	TRNST73B	Office of Education, HEGIS Surveys, 1972-73 1) Institutional characteristics 2) Opening fall enrollment 3) Employee (no salary data) 4) Basic student charges (301 variables, 3,496 institutions/ campuses)	Public
(23)	VOLSUP72	Council for Financial Aid to Education Voluntary Support Survey, 1971-72 (private support to institutions by source and use) (156 variables, 1,450 institutions)	Public

Appendix C: Calculation of Price Response Coefficients

The price response coefficients used in the NCFPE model were derived from the estimated coefficients presented in the study by Miller and Radner.[1] The procedure followed in computing the price response coefficients is outlined below in a series of steps.

Step 1: Compute the distribution of students by ability for each of the income categories.

a) raw data is from Table 2.1 in Miller-Radner.

b) contruct the ability distribution as shown in Table C-1.

Step 2: Compute the predicted probabilities and the beta coefficients collapsed over ability using the weights given in Table C-1.

a) raw data is from Table 2.7 in Miller-Radner.

b) Compute the collapsed probabilities and coefficients as illustrated in Table C-2.

Step 3: Formulate the partial derivatives of the probability functions developed in Miller-Radner.

let C_{ij} = the out-of pocket dollar cost to individual i of going to alternative j.

ϕ_{ij} = the probability that individual i chooses choice type j.

β_i = estimated coefficient for family income level i of the Miller-Radner model.

Y_i = family income of individual i.

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[1] L. Miller and R. Radner, "Demand for Places: Summary of Results," draft of Chapter 2 of forthcoming book, University of California at Berkeley, 1973.

Table C-1: Ability Distribution by Income

Ability Level	Income ≤ 7,499		7,500 - 14,999		Income ≥ 15,000	
	Students in sample	% weight	Students in sample	% weight	Students in sample	% weight
Lower 25%	432	.267	134	.119	25	.077
Middle lower 25%	426	.263	245	.218	52	.160
Middle upper 25%	362	.223	284	.252	78	.239
Upper 25%	400	.247	463	.411	171	.524
Total	1,620	1.000	1,126	1.000	326	1.000

Table C-2: Calculation of Weighted Probabilities

Income & Institutional Type	Ability Lower 25% prob.	wt.	Ability Mid lower 25% prob.	wt.	Ability Mid upper 25% prob.	wt.	Ability Upper 25% prob.	wt.	Weighted Probability
Low Income									
A	.271	.267	.214	.263	.049	.223	.031	.247	.147
B	.0	.267	.182	.263	.142	.223	.102	.247	.105
C	.0	.267	.0	.263	.239	.223	.184	.247	.099
D	.086	.267	.100	.263	.035	.223	.022	.247	.063
E	.0	.267	.127	.263	.121	.223	.087	.247	.082
F	.0	.267	.0	.263	.205	.223	.158	.247	.085
G	.0	.267	.061	.263	.070	.223	.048	.247	.044
H	.0	.267	.057	.263	.113	.223	.084	.247	.061
I	.0	.267	.0	.263	.0	.223	.269	.247	.066
Middle Income									
A	.268	.119	.185	.218	.045	.252	.027	.411	.095
B	.0	.119	.160	.218	.131	.252	.090	.411	.105
C	.0	.119	.0	.218	.223	.252	.164	.411	.124
D	.151	.119	.126	.218	.038	.252	.023	.411	.064
E	.0	.119	.134	.218	.121	.252	.083	.411	.094
F	.0	.119	.0	.218	.206	.252	.152	.411	.114
G	.0	.119	.094	.218	.081	.252	.054	.411	.063
H	.0	.119	.089	.218	.132	.252	.094	.411	.091
I	.0	.119	.0	.218	.0	.252	.301	.411	.124
High Income									
A	.264	.077	.174	.160	.043	.239	.025	.524	.072
B	.0	.077	.152	.160	.127	.239	.086	.524	.100
C	.0	.077	.0	.160	.217	.239	.157	.524	.134
D	.180	.077	.135	.160	.039	.239	.023	.524	.057
E	.0	.077	.135	.160	.120	.239	.081	.524	.093
F	.0	.077	.0	.160	.206	.239	.150	.524	.128
G	.0	.077	.107	.160	.086	.239	.056	.524	.067
H	.0	.077	.102	.160	.139	.239	.097	.524	.100
I	.0	.077	.0	.160	.0	.239	.312	.524	.163
Beta Coefficients									
Low I	3.592	.267	2.407	.263	1.031	.223	1.031	.247	2.077
Middle I	3.592	.119	2.407	.218	1.031	.252	1.031	.411	1.636
High I	3.592	.077	2.407	.160	1.031	.239	1.031	.524	1.448

then $$\frac{2\phi_{ij}}{2C_{ij}} = (\beta_i / Y_i)\ \phi_{ij}\ (1 - \phi_{ij})$$

and $$\frac{2\phi_{ik}}{2C_{ij}} = -(\beta_i / Y_i)\ \phi_{ik}\ \phi_{ij}$$

Step 4: Calculate the <u>direct</u> price response coefficients:

$$\frac{2\phi_{ij}}{2C_{ij}} / \phi_{ij} = (\beta_i / Y_i)\ (1 - \phi_{ij})$$

these calculations are shown in Table C-3.

Step 5: Calculate the <u>indirect</u> price response coefficients:

$$\frac{2\phi_{ik}}{2C_{ij}} / \phi_{ik} = (\beta_i / Y_i)\ \phi_{ij}$$

these calculations are shown in Table C-3.

Step 6: Map the Miller-Radner institutional categories onto the NCFPE's institutional categories.

<u>Miller-Radner Institutional Categories</u>

A - public community colleges
B - public state colleges
C - public universities
D - trade schools and private junior colleges
E - public state colleges
F - public universities
G - }
H - } private four year colleges and universities
I - }

Table C-3: Calculation of Price Response Coefficients

Income & Institutional Type	ϕ_{ii}	β_k	Y_i	Direct Price Response Coefficients	Indirect Price Response Coefficients
Low Income					
A	.147	2.077	6,000	.000295	.000051
B	.105	2.077	6,000	.000309	.000036
C	.099	2.077	6,000	.000311	.000034
D	.063	2.077	6,000	.000324	.000022
E	.082	2.077	6,000	.000317	.000028
F	.085	2.077	6,000	.000316	.000029
G	.044	2.077	6,000	.000330	.000015
H	.061	2.077	6,000	.000325	.000010
I	.066	2.077	6,000	.000323	.000023
Middle Income					
A	.095	1.636	12,000	.000123	.000013
B	.105	1.636	12,000	.000122	.000014
C	.124	1.636	12,000	.000119	.000017
D	.064	1.636	12,000	.000128	.000009
E	.094	1.636	12,000	.000124	.000013
F	.114	1.636	12,000	.000121	.000016
G	.063	1.636	12,000	.000128	.000009
H	.091	1.636	12,000	.000124	.000012
I	.124	1.636	12,000	.000119	.000017
High Income					
A	.072	1.448	18,000	.000075	.000006
B	.100	1.448	18,000	.000072	.000008
C	.134	1.448	18,000	.000070	.000011
D	.057	1.448	18,000	.000076	.000005
E	.093	1.448	18,000	.000073	.000007
F	.128	1.448	18,000	.000070	.000010
G	.067	1.448	18,000	.000075	.000005
H	.100	1.448	18,000	.000072	.000008
I	.163	1.448	18,000	.000067	.000013

NCFPE Institutional Categories

		M-R Categories
(1)	Public 2 year	A
(2)	Public 4 year LD	average (B,C,E,F)
(3)	Public 4 year UD	average (B,C,E,F)
(4)	Public 4 year GD	average (B,C,E,F)
(5)	Private 2 year	D
(6)	Private 4 year LD	average (G,H,I)
(7)	Private 4 year UD	average (G,H,I)
(8)	Private 4 year GD	average (G,H,I)
(9)	Proprietary schools	D

Step 7: Construct the price response matrices used by the model by mapping the Miller-Radner institutional coefficients onto the NCFPE institutional categories. The results of these calculations are given in Tables 13a, 13b, and 13c in Chapter 3, pages 54 and 55 of this staff report. Note that the numbers in these Tables represent the change in the probability for a $100 change in tuition.

Appendix D: User's Introduction to the Commission's Postsecondary Education Data Base

Introduction

The National Commission implemented a large scale data base and used a number of data processing techniques to support its analytical effort. These techniques included the use of on-line programming, statistical analysis (software) packages, interactive models, and a data manipulation and retrieval system. This appendix describes the development and use of these capabilities.

While none of these techniques are themselves new, the integrated use of such data processing tools provided effective and efficient support to the Commission's analytical effort and significantly changed the Commission's method of operation.

The principal problems of developing this capability were not technical. They were rather the economic and organizational problems inherent in obtaining machine readable data, resolving the definitional and coding problems, and training analysts to use the new tools.

This appendix is designed to provide only a brief introduction to the Commission's data base and, in connection with it, the various analytical capabilities utilized by the staff. General guidelines on how to retrieve information from the data base and how to perform statistical analyses on the data are presented here. And detailed manuals on specific software packages will be referenced to assist the reader who desires more information on the mechanics of using the data base.

1. Hardware and Software Considerations

Members of the Commission's research staff had to select a data retrieval language capable of meeting the Commission's many needs. They used five criteria in selecting a data inquiry or retrieval language:

(1) The computer language would have to be capable of selective retrieval, formatted reports, computed values, and elementary

statistics.

(2) It should already be in use--preferably fully implemented, with a history of operating reliably at an available service bureau.

(3) It should be readily usable by analysts without extensive training.

(4) It should operate on a data base that could concurrently be accessed by FORTRAN, PL/1, and COBOL programs.

(5) It should be reasonably economic and, if possible, available within the federal government.

After some staff investigation, System Development Corporation's (SDC) DS/3 language was selected. The language appeared to have several advantages for the Commission's use. First, it had the required language capabilities. Second, and quite important, DS/3 operated on standard IBM OS data sets. This capability meant that the development of FORTRAN models could proceed concurrently, and that standard statistical packages, like the Statistical Package for Social Sciences (SPSS), could be used. Third, DS/3 was expected to be operational in the federal government, specifically at the Data Management Center of the Department of Health, Education, and Welfare. Also, SDC had DS/3 fully operational at the Santa Monica Corporate Computer Facility for several months. Fourth, the documentation of the system was reasonably clear and the language was, at least to those who selected it, rational. The language seemed to be intuitively clear to non-programmers.

The staff also took care in selecting the most appropriate hardware for the Commission's computing needs. The SDC Corporate Computer Facility provided the Commission with several desirable features. First, the data base was implemented on an IBM 370/158 computer operating under VS2 at SDC. The characteristic of the Virtual System (VS2) enabled SDC to provide responsive on-line computing service through time-sharing terminals to many users simultaneously. Second, SDC had a number of IBM 3330 disk storage units on-line that provided adequate storage space for the Commission's many data files (approximately 110 million bytes). Third, SDC offered time-sharing services every day except Sunday from 5 a.m. to midnight Pacific time. Sundays, upon request, it was available from 1 to

9 p.m. Fourth, the SDC system rarely was inoperable.

In addition to the SDC facility, the National Commission also maintained two of the institutional data files at the Data Management Center of the Department of Health, Education, and Welfare (HEW) in Washington, D.C. Because some of the institutional finance data was confidential, it was not possible to keep all of the finance data in the file at SDC in Santa Monica. On the other hand, the Time-Sharing Option (TSO) system was not available at HEW's Data Management Center, so special programs like SPSS and BMD could not be used at the Washington facility. For this reason, as much of the data as possible was maintained in the files at SDC in Santa Monica.

The relationships between the data base, DS/3, the statistical packages, and the language processors are shown in Table D-1. Because of the characteristics of the TSO system and its associated software, all of these capabilities were available to the terminal user in conjunction with the NCFPE data base. This combination of data, models, and software represented a significant increase in the availability and usefulness of data on postsecondary education.

2. Retrieving Information from the Data Base

Of great service to the research staff was the capacity to access any piece of information from the extensive data base in a matter of seconds. The hardware and software that the staff selected allowed the analyst to access the data quickly and to structure the data (stored in basic, but edited form) to suit information needs.

To indicate the data retrieval and query capabilities of the NCFPE data base available through DS/3, an example is useful. Table D-2 illustrates the basic DS/3 PRINT command. The data elements can be referred to by name, as shown, or by element number. The PRINT statement permits immediate selection of a subset of observations by using the WHERE command. Table D-2 shows a typical retrieval of data for Carnegie Classification 11, major research universities. Column headings are supplied automatically by DS/3. The user is given the opportunity to print a small sample, to search the entire file, or to

Table D-1:

Data Processing Capabilities

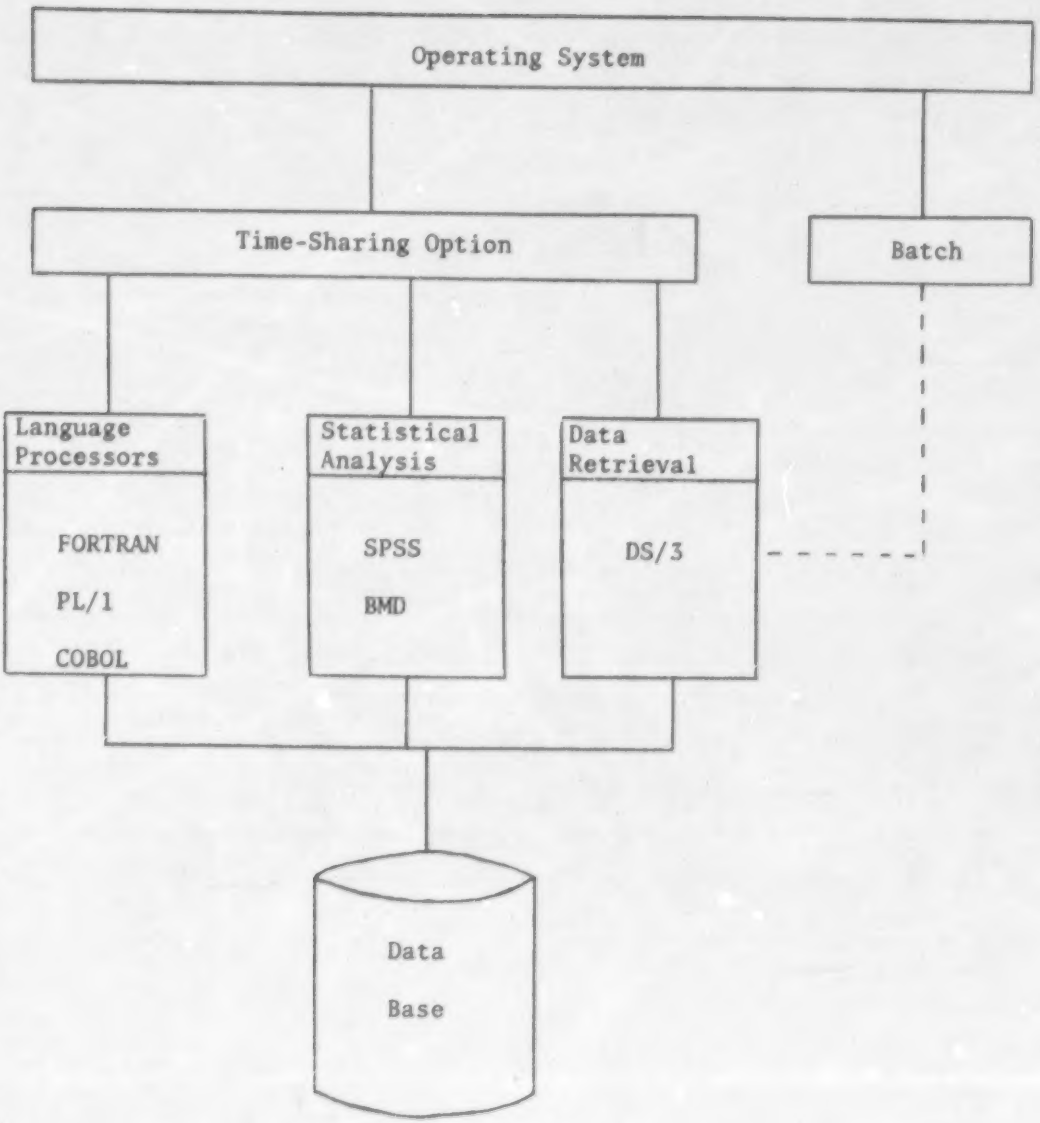

Table D-2: Sample Data Retrieval Through DS/3

Print Command:

```
-PRINT FICE, INSTNAME, CARNCODE, ENTOT, ENDRGTOT/ENTOT
-       WHERE CARNCODE EQ 11
    68 COLUMNS - (Y/F/B):
-Y
```

INST FICE CODE	INSTITUTION NAME	CARN CLASS CODE	FALL 70 TOTAL ENROLLMENT	PERCENT GRADUATE
1131	CAL INST OF TECH	11	1,512	0.49
1305	STANFORD UNIVERSITY	11	12,566	0.43
1312	U OF CAL BERKELEY	11	34,799	0.26
1313	U OF CAL DAVIS	11	16,556	0.14
1315	U OF CAL LOS ANGELES	11	46,669	0.12

Summary Command:

```
-SUMMARY SSINCOME, SSTUIFEE, SSSTSCHL & SSOTHSCH
    70 COLUMNS - (Y/F/B):
-F
```

	SSINCOME	SSTUIFEE	SSSTSCHL & SSOTHSCH
ENT	2973	3099	2983
SUM	$33,105,073	$3,936,338	$2,420,132
AVE	$11,135	$1,270	$811
MIN	$0	$0	$0
MAX	$75,000	$4,000	$4,400

(Summary statistics for all students of family income, tuition and fees paid, and total scholarship dollars received.)

process the inquiry in a batch mode. In Table D-2, which shows the selection of a sample, the 'Y' signifies the user's response. The second part of Table D-2 illustrates the SUMMARY command. The result of this command is the outputting of basic statistics on each of the variables requested.

DS/3 has many more commands and features than are illustrated in this appendix. It provides the analyst with a capability of probing the data; that is, initial queries of the data may yield information that will stimulate further queries. Interacting with the data on an on-line basis provides the analyst with the luxury of more in-depth exploration of the data. Details on this data retrieval language are given in the DS/3 Primer (For the Terminal User), System Development Corporation (February 1973). Detailed descriptions, listing and defining all of the variables in each NCFPE data base file, are organized by DS/3 headings in the NCFPE National Postsecondary Education Data Base Directory (Government Printing Office, 1974).

3. Statistical Analyses

Since the DS/3 data management software operated on standard IBM OS data sets, it was very easy for the research staff to perform statistical analyses on the same data sets. SDC supported both SPSS and BMD on their TSO system; therefore, the staff could access those packages at time-sharing terminals.

Table D-3 presents the input required by the user to set up a regression analysis on selected variables from the STSCHLR (State Scholarship) student data file using the SPSS regression routine. The input format for the data file follows directly from the DS/3 file definitions, and the same mnemonic names for the variables in DS/3 are used to allow clearer interpretation of the output. The statistical results from this simple regression analysis are also presented in Table D-3.

The data sets as defined and constructed for use by DS/3 can be accessed through on-line statistical packages. No complicated reformatting or special file construction is needed. This feature gives the analyst the capability of performing more complicated

Table D-3: Sample Statistical Analysis

Input:*

```
00010  RUN NAME              ANALYSIS OF STATE SCHOLARSHIP DATA
00020  VARIABLE LIST         SSINCØME, SSTUIFEE, SSSTSCHL
00030  INPUT MEDIUM          DISK
00040  # OF CASES            3110
00050  INPUT FØRMAT          FIXED (11X, F5.0, 41X, F4.0, 40X, F4.0)
00060  CØMPUTE               NEEDRAT = SSTUIFEE/SSINCOME
00070  CØMPUTE               NEEDR2 = NEEDRAT * * 2
00080  PRINT FØRMATS         NEEDRAT, NEEDR2, SSINCØME TO SSSTSCHL (0)
00090  REGRESSIØN            VARIABLES = SSSTSCHL, NEEDRAT, NEEDR2
00100                        REGRESSION = SSSTSCHL WITH NEEDRAT, NEEDR2 (2)
00110  READ INPUT DATA
00120  FINISH
```

*For Output, see next pages.

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(Table D-3, continued)

Output:

```
STATISTICAL PACKAGE FOR THE SOCIAL SCIENCES, VERSION OF 02/01/72                01/24/74      PAGE 1

                 RUN NAME          ANALYSIS OF STATE SCHOLARSHIP DATA
                 VARIABLE LIST     SSINCOME, SSTUIFEE, SSSTSCHL
                 INPUT MEDIUM      DISK
                 # OF CASES        3110
                 INPUT FORMAT      FIXED (11X,F5.0,41X,F4.0,40X,F4.0)
IGNORING INDEFINITE REPETITION, THE INPUT FORMAT PROVIDES FOR 3 VARIABLES.  3 WILL BE READ
IT PROVIDES FOR 1 RECORDS ('CARDS') PER CASE.  A MAXIMUM OF 105 'COLUMNS' ARE USED ON A RECORD

                 COMPUTE           NEEDRAT=SSTUIFEE/SSINCOME
                 COMPUTE           NEEDR2=NEEDRAT**2
                 PRINT FORMATS     NEEDRAT, NEEDR2, SSINCOME TO SSSTSCHL (0)
                 REGRESSION        VARIABLES=SSSTSCHL, NEEDRAT, NEEDR2
                                   REGRESSION=SSSTSCHL WITH NEEDRAT, NEEDR2 (2)

                 READ INPUT DATA
ANALYSIS OF STATE SCHOLARSHIP DATA                                              01/24/74      PAGE 2

FILE    NONAME  (CREATION DATE = 01/24/74)
* * * * * * * * * * * * * * * * * * * *M U L T I P L E  R E G R E S S I O N* * * * * * * * * * * * * * * *
DEPENDENT VARIABLE..       SSSTSCHL
VARIABLE(S) ENTERED ON STEP NUMBER 1..   NEEDR2
                                         NEEDRAT

MULTIPLE R          0.41777       ANALYSIS OF VARIANCE   OF    SUM OF SQUARES     MEAN SQUARE       F
R SQUARE            0.17453       REGRESSION              2.  153602339.24356  76801169.62178   328.45929
STANDARD ERROR    483.55196       RESIDUAL             3107   726486492.15066    233822.49506

---------VARIABLES IN THE EQUATION---------           -------VARIABLES NOT IN THE EQUATION---------

VARIABLE        B           BETA     STD ERROR B    F      VARIABLE     BETA IN   PARTIAL  TOLERANCE   F

NEEDR2       -245.30056   -0.38310   15.37293   254.615
NEEDRAT      1536.17696    0.60821   60.63940   641.760
(CONSTANT)    333.50195

ANN VARIABLES ARE IN THE EQUATION
ANALYSIS OF STATE SCHOLARSHIP DATA                                              01/24/74      PAGE 3
ALL
```

(Table D-3, continued)

FILE NONAME (CREATION DATE = 01/24/74)
* M U L T I P L E R E G R E S S I O N * * * * * * * * * * * * * * * * * * *

DEPENDENT VARIABLE. . SSSTSCHL

SUMMARY TABLE

VARIABLE	MUTLIPLE R	R SQUARE	RSQ CHANGE	SIMPLE R	B	BETA
NEEDR2	0.06346	0.00403	0.00403	0.06346	-245.30056	-0.38310
NEEDRAT	0.41777	0.17453	0.17050	0.32693	1536.17696	0.60821
(CONSTANT)					330.50195	

ANALYSIS OF STATE SCHOLARSHIP DATA 01/24/74 PAGE 4

*****159664 BYTES FROM GIVEN SPACE NOT USED FOR REGRESSION******

FINISH

ANALYSIS OF STATE SCHOLARSHIP DATA 01/24/74 PAGE 5

NORMAL END OF JOB.
12 CONTROL CARDS WERE PROCESSED.
0 ERRORS WERE DETECTED.

statistical tasks with the data base, after initial queries and basic analyses have been performed by using a data retrieval language such as DS/3. For additional detail on SPSS, see SPSS: Statistical Package for the Social Sciences by N. Nie, D. Bent, and C. Hull (McGraw-Hill, 1970).

4. Users of the Data Base

Potentially, there are many users of the NCFPE data base or a similar national postsecondary education base of data on institutions and students. Federal, state, and private education agencies as well as a large number of research groups should have interests in accessing such a large base of information on the postsecondary education sector.

Currently, several groups have expressed interest in using the data; a few have actually been utilizing the data base for the past several months. For example, representatives of the Association of Independent California Colleges and Universities (AICCU) in Los Angeles and the National Center for Higher Education Management Systems (NCHEMS) in Boulder, Colorado, requested permission to use the NCFPE data base through the SDC Santa Monica facility. Arrangements were made through SDC for these two organizations to use the data base. At no cost to the Commission, both groups contracted for DS/3 and TSO service and were given file descriptions. AICCU has created a special data base for California, and it has also used some of the student survey files. AICCU staff members believe that this use of the data base has significantly improved their research capabilities.

In addition, several agencies and research organizations have been given demonstrations of the data base and the associated analytical capabilities. The California Department of Finance and the Nebraska Legislative Fiscal Office requested demonstrations and used the system briefly to answer some of their questions.

Already, such uses of the NCFPE data base indicate the potential for improving the capability of a number of postsecondary education organizations and agencies in gaining access to useful information.

The value of information like Office of Education HEGIS files, when it becomes immediately and easily available, has also been demonstrated.

Perhaps this experience will be the forerunner of a national data base readily accessible to all potential users anywhere in the country through time-sharing terminals.

5. Costs of Maintaining and Using the Data Base

It is difficult to determine the costs of a system like the one described here. The costs are more a function of the specific charging algorithm than any system characteristics. The costs per terminal hour at the SDC facility are dependent upon the skill of the user, the type of data retrieval, and the type of terminal used. In the Commission's experience, the costs varied from $14 to $157 per terminal hour initially. By using much larger blocking factors on the data files and by gaining experience with using DS/3 and TSO, the cost per terminal hour decreased sharply. It appears that the cost for DS/3 at the SDC computer facility would be $20 to $35 per terminal hour. Further experience by users should reduce costs at the SDC facility.

6. The Future of the Data Base

The experience of the National Commission has demonstrated that a national data base is economically feasible. In fact, the data base saves researchers and analysts considerable money, for they otherwise have to locate tapes and write special programs in order to have access to such data.

But more important, through the data base, access to data is provided in minutes rather than months. While this timesaving is, in part, the result of telecommunications and data processing technology, it is also, in part, achieved by determining the policy for data access in advance rather than on an individual, case by case basis. In addition, data processing becomes the responsibility of the user of the data rather than the provider of the data.

If policy analysis is to affect the course of decision making, it will have to be responsive to the policy makers decision-making time frame. While it is not possible to determine how responsive policy analysis must be, some congressional staff members have indicated that they usually need access to information within 48 hours. After that, the legislative decisions have usually been made. If this time frame is the basic criteria for policy analysis, then clearly this kind of technology and data base will be required for future decision making.

In summary, the Commission's experience has demonstrated the technical and economic feasibility of a nationally-maintained data base for postsecondary education.

Readers interested in accessing the Commission's data base should contact:

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National Center for Educational Statistics
U.S. Office of Education
400 Maryland Avenue, S.W.
Washington, D.C. 20202
(202) 245-8760

Appendix E: User's Guide to the Commission's Postsecondary Education Financing Model

Introduction

The primary purpose of developing this postsecondary education financing model was to provide the National Commission with an analytical tool for evaluating a wide spectrum of alternative financing policies, especially in projecting the likely impacts of various plans upon certain postsecondary education objectives. The results of employing this model, however, were only one of many elements in the Commission's evaluation of alternative financing proposals. That is, since not all dimensions of the subject of financing postsecondary education can be quantitatively measured and incorporated into a model, other more subjective and qualitative information was needed for the Commission's final evaluation. But the model was indeed the primary source of the aggregate enrollment and aggregate financial information utilized in the Commission's analysis of policy alternatives.

For further orientation on the scope and role of the model, the potential user should consider the model's three major characteristics. First, the policy parameters incorporated in the model, specified in detail in Table 14 of the text, are broad. The major policy areas are these: tuitions at public institutions, student aid programs, and institutional support policies. Second, the behavioral relationships in the model primarily deal with student responses to price changes; the model's ability to deal with the responses of institutions and governmental units to differing policies is very limited. Third, the model's output--impact measures--are broad, including: (1) enrollments by family income categories, student levels (lower division, upper division, graduate), and institutional sectors (2-year, 4-year, public, private, noncollegiate); (2) distributions of student aid by family income categories, student levels, and institutional sectors; (3) net prices by family income categories, student levels, and institutional sectors; and (4) direct and induced costs of financing policies by source of financing (Federal, state, local, private, students) and by institutional sectors. (These

measures are illustrated in detail later in this guide.)

The model as it currently exists may or may not fit the exact needs of other policy analysts. Before using the model, users should make sure that the model's characteristics fit their policy making needs. The documentation provided in the text of this staff report should provide a potential user with adequate information to enable him or her to make this decision.

Note also that this appendix is titled a "user's guide" and not a "programmer's manual." This appendix does not provide details on the model's FORTRAN programs to enable a programmer to modify the program. Rather, the intent is to provide some basic information on how to use the model in its present form on either the Time-Sharing Option (TSO) system at System Development Corporation (SDC) or on another system with suitable characteristics.

1. Characteristics of the Selected Hardware

The National Commission developed, implemented, and extensively used its model on the TSO system available at the Virtual System (VS), IBM 360-158 at SDC's Corporate Computing Facility (CCF) in Santa Monica, California. Rather than describe the technical characteristics of this computing facility, this section lists and describes those characteristics of the model's operation that pertain to possible hardware limitations.

(1) FORTRAN. The model's three computer programs are coded in FORTRAN IV and compiled under option G1. No conversions to other compiler languages have been attempted to date.

(2) Size. The combined programs currently contain 2,087 FORTRAN statements and require 167,000 bytes of storage. In addition, operation of the model requires six data files with a total of 840,000 bytes of storage. Total core required for execution of the model is 300,000 bytes.

(3) Data files. The program requires six files to be allocated simultaneously during execution of the model.

(4) Time-share input. The input phase of the model was designed on a question/answer or interactive concept. The model asks for the value of each of the policy parameters, and the user simply supplies the values in *free format* on the terminal.

(5) Keyboard terminals. The model can be accessed through the SDC system with a large variety of terminals. Three line speeds (10, 15, and 30 cps) are supported. Therefore, such terminals as the IBM 2741, the Teletype Corporation ASCII, the Anderson-Jacobson 30 cps ASCII, and the Texas Instrument 30 cps ASCII terminals can be utilized for running the model. All of the output tables from the report generator were designed to fit within a 72 character print field. This field width is compatible with almost all terminal printers.

(6) Run time and cost. Average input time on the terminal is approximately 20 minutes. Of course, this amount of time varies with the user's preparation and typing skill. Calculation time is only a matter of seconds. Output printing takes about one minute per report page. The total cost of running the model to analyze one policy alternative is in the range of $5-$10.

2. Structure of the Software for the Model

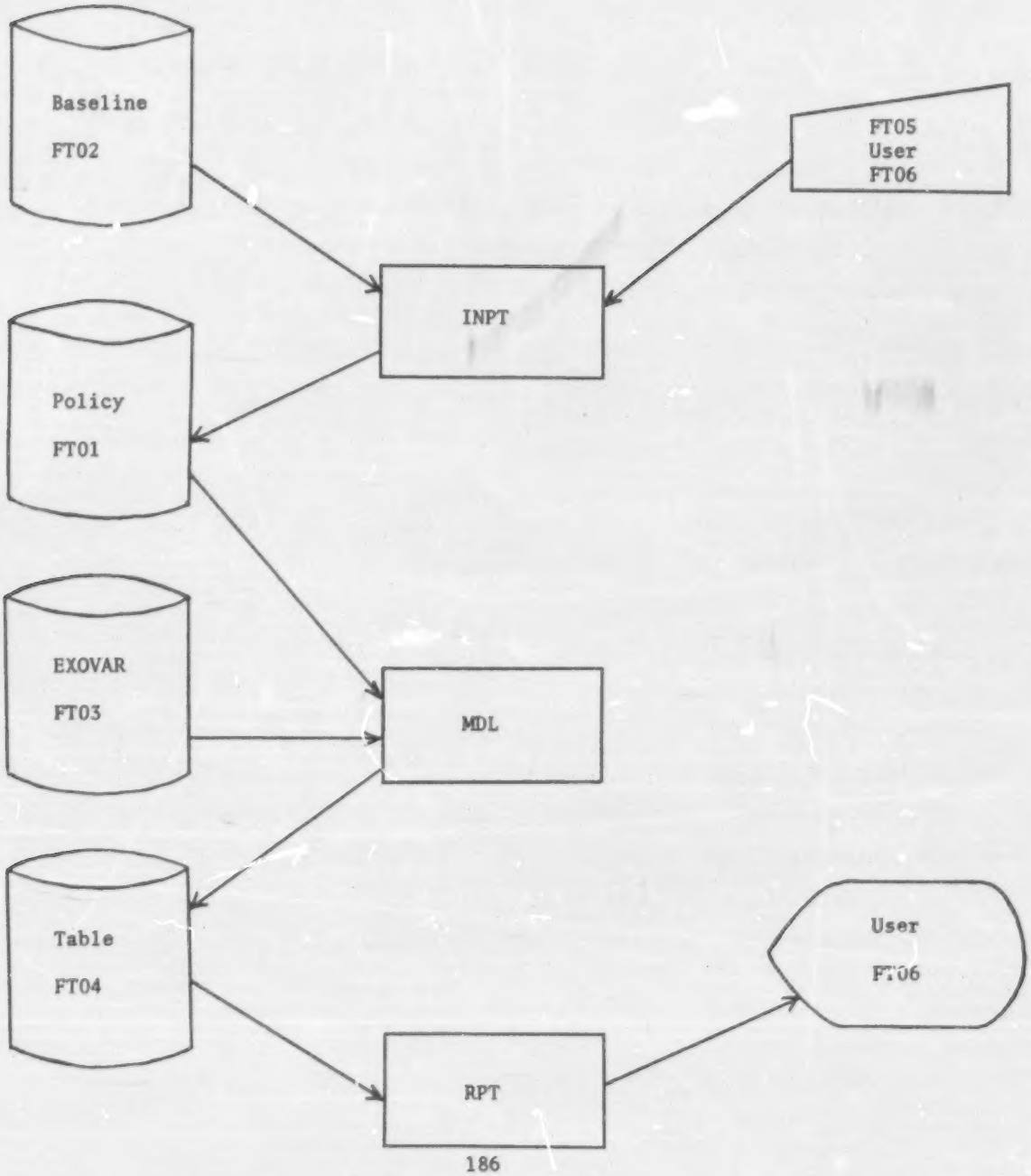
The FORTRAN program for the model was developed as three separate programs. See Table E-1 for an illustration of these program components and the four data files.

The input program (INPT) provides the interaction with the user. Via the interactive dialog procedure available on TSO, the user can specifiy all of the policy parameters for a specific analysis. The input program combines this policy information with other basic information contained in the BASELINE data file. All of this information is combined and outputted into a temporary storage file called POLICY, as shown in Table E-1.

The MDL program reads in all of the information contained in the POLICY and the EXOVAR data files and performs all of the calculations of the model. This program does not require any interaction with or input from the user. The results from these calculations are stored

Table E-1:

Diagram of Data Files and Programs



temporarily in the TABLE data file. None of the results are printed out for the user in MDL.

All of the output reports prepared by the model for the user are printed by the report writing program (RPT). As with MDL, RPT requires no input from the user. Also, no additional calculations are performed in RPT.

The rationale for structuring the model with three separate programs and temporary, intermediate storage files was to give the Commission's staff more flexibility in developing and using the model. Multiple reports can be generated by simply executing RPT additional times. By executing MDL and RPT in sequence, changes in enrollment projections, income distributions, price response coefficients, and other exogenous variables can be made and the model recalculated using the same set of policy parameters. This procedure allows the user to avoid running through the interactive input phase (INPT) and specifying all of the parameters for the same policy again. Also, this structure ensures that intermediate results are saved in cases of machine failure or other hardware problems.

To further illustrate the sequence of program execution and the linkages between data files, Table E-2 shows the file allocations and the execution statements for each program. Any modification of the sequencing of programs would require changing this control statement list (CLIST).

3. Data Files

The actual data files used by the model, along with their exact contents, are presented in Tables E-5 and E-6. The definitions of the nine institutional categories and eleven income categories referred to in the descriptions of these files are displayed in Tables E-3 and E-4.

On the TSO system, the procedure for changing values in either the BASELINE or EXOVAR files is very easy. Individual data elements, segments of data entries, or the entire file can be replaced with new values. Making these changes does require a general familiarization with TSO. Although it is not the purpose of TSO, Tables E-5 and

Table E-2: List of File Allocations
and Program Control Statements

```
NCFPE.  CRØSS.  MODEL.  CLIST.
00010  ALLØC F(FT01F001)  DA(POLICY. DATA)
00020  ALLOC F(FT02F001)  DA(BASELINE. DATA)
00030  ALLOC F(FT03F001)  DA(EXOVAR. DATA)
00040  ALLOC F(FT04F001)  DA(TABLE. DATA)
00050  ALLOC F(FT05F001)  DA(*)
00060  ALLOC F(FT06F001)  DA(*)
00070  LOADGO  INPT.OBJ  LIB('SYS2.FORTLIB') FORTLIB
00080  LOADGO  MDL.OBJ  FORTLIB
00090  LOADGO  RPT.OBJ  FORTLIB
```

Table E-3: Institutional Categories

Institutional Category	Description
1	Public two-year
2	Public four-year, lower division
3	Public four-year, upper division
4	Public four-year, graduate
5	Private two-year
6	Private four-year, lower division
7	Private four-year, upper division
8	Private four-year, graduate
9	Noncollegiate

Table E-4: Family Income Categories

Category	Family Income Range
1	0 - 999
2	1,000 - 1,999
3	2,000 - 2,999
4	3,000 - 3,999
5	4,000 - 4,999
6	5,000 - 5,999
7	6,000 - 7,499
8	7,500 - 9,999
9	10,000 - 14,999
10	15,000 - 24,999
11	25,000 - over

Table E-5: Contents of BASELINE DATA

	145	440	440	440	1538	1538	1538	1538	1000
0010*									
	105643000	103113000		85805000		54847000		4073000	
0020									
	42360000	32352000		26387000					
0030									
	900000000	2535885000		2110240000		1348875000		1000000	
0040									
	108521000	82880000		67599000		31811000			
0050									
	2234000	672000		559000		358000		984000	
0060									
	435000	332000		271000					
0070									
	7670000	46915000		39040000		24955000		33923000	
0080									
	388796000	296932000		242186000		772000			
0090									
	44596000	79401000		66074000		42235000		6011000	
0100									
	55584000	42451000		34264000					
0110									
	21000000	43146000		35904000		22950000		1000000	
0120									
	74163000	56640000		46197000					
0130									
	8872000	33717000		28058000		17935000		3115000	
0140									
	67021000	51186000		41748000					
0150									
	15000	15000		15000		15000		15000	
0160									
	15000	15000		15000		15000			
0170									
	15000	15000		15000		15000		15000	
0180									
	15000	15000		15000		15000			
0190									
	15000	15000		15000		15000		15000	
0200									
	15000	15000		15000		15000			
0210									
	100000	100000							
0220									
	1501	1533		2300		4600		2163	
0230									
	2019	3029		6057		1000			
0240									

Current tuition by institutional sector

Federal institutional aid by sector

State institutional aid by sector

Local institutional aid by sector

Private institutional aid by sector

Federal student aid by institutional sector

State student aid by institutional sector

Private student aid by institutional sector

Federal student aid income cutoff by institutional sector

State student aid income cutoff by institutional sector

Private student aid income cutoff by institutional sector

Federal-state-local transfers

Average cost per student by institutional sector

*line sequence number - refers to line directly above

Table E-6: Contents of EXOVAR DATA

1.058						Inflation rate
0010 *						
1763000	1836000	1913000	1990000	2056000	2108000	Enrollment forecast by year, 1974-85, institutional sector 1
0020						
2138000	2155000	2162000	2146000	2106	2052000	
0030						
1797200	1810000	1832400	1856800	1880800	1893600	institutional sector 2
0040						
1894000	1890400	1874000	1845200	1807200	1760000	
0050						
1612990	1624475	1644580	1666480	1688020	1699510	institutional sector 3
0060						
1699865	1696635	1681915	1656065	1621960	1579600	
0070						
1082810	1090525	1104020	1118720	1133180	1114090	institutional sector 4
0080						
1114135	1138965	1129085	1111735	1088840	1060400	
0090						
95000	92000	94000	97000	98000	99000	institutional sector 5
0100						
100000	100000	99000	97000	95000	93000	
0110						
823750	831500	839255	849455	860470	868225	institutional sector 6
0120						
867410	863330	858840	844970	822935	792740	
0130						
646080	652160	658240	666240	674880	680960	institutional sector 7
0140						
680320	677120	673600	662720	645440	621760	
0150						
549170	554340	559505	566305	573650	578815	institutional sector 8
0160						
578270	575550	572560	563310	548625	528500	
0170						
1632000	1662000	1698000	1732000	1767000	1802000	institutional sector 9
0180						
1838000	1875000	1912000	1950000	1990000	2029000	
0190						

*line sequence number - refers to line directly above

(Table E-6, continued)

0200	.6	1.2	2.5	3.9	4.5	4.5			% distribution of enrollment by income-institutional sector 1
0210	8.2	13.8	33.0	20.8	7.0				
0220	.7	1.5	1.6	3.0	5.0	4.7			institutional sector 2
0230	6.4	13.7	28.0	24.5	10.9				
0240	.7	1.5	1.6	3.0	5.0	4.7			institutional sector 3
0250	6.4	13.7	28.0	24.5	10.9				
0260	.3	.6	1.1	2.3	3.6	2.7			institutional sector 4
0270	5.1	12.2	33.9	29.7	8.5				
0280	.0	4.2	1.4	1.4	.0	2.8			institutional sector 5
0290	9.7	13.9	31.9	19.4	15.3				
0300	.2	1.0	2.9	3.2	2.2	3.8			institutional sector 6
0310	5.5	10.7	27.6	25.7	17.2				
0320	.2	1.0	2.9	3.2	2.2	3.8			institutional sector 7
0330	5.5	10.7	27.6	25.7	17.2				
0340	.0	2.4	.8	.0	2.4	4.8			institutional sector 8
0350	3.2	9.6	32.0	28.0	16.8				
0360	1.3	1.9	2.5	4.5	5.4	5.1			institutional sector 9
0370	9.4	15.8	30.2	18.7	5.2				
0380	145	440	440	440	1538	1538	1538	1538	1000 Current tuition by sector
0390	119	317	317	317	1238	1238	1238	1238	1000 Current net price by sector

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(Table E-6, continued)

95	.0321	0.0	0.0	.0218	.0161	0.0	0.0	.0218	Low income price response coefficients - institutional sector by institutional sector
0									
09	-.313	0.0	0.0	.0218	.0161	0.0	0.0	.0218	
0									
	0.0	-.313	0.0	0.0	0.0	.0161	0.0	0.0	
20									
	0.0	0.0	-.313	0.0	0.0	0.0	.0161	0.0	
0									
09	.0321	0.0	0.0	-.324	.0161	0.0	0.0	.0218	
0									
09	.0321	0.0	0.0	.0218	-.326	0.0	0.0	.0218	
0									
	0.0	.0321	0.0	0.0	0.0	-.326	0.0	0.0	
0									
	0.0	0.0	.0321	0.0	0.0	0.0	-.326	0.0	
0									
09	.0321	0.0	0.0	.0218	.0161	0.0	0.0	-.324	
0									
23	.0149	0.0	0.0	.0087	.0126	0.0	0.0	.0087	Middle income price response coefficients - institutional sector by institutional sector
0									
30	-.122	0.0	0.0	.0087	.0126	0.0	0.0	.0087	
0									
	0.0	-.122	0.0	0.0	0.0	.0126	0.0	0.0	
0									
	0.0	0.0	-.122	0.0	0.0	0.0	.0126	0.0	
0									
30	.0149	0.0	0.0	-.128	.0126	0.0	0.0	.0087	
0									
30	.0149	0.0	0.0	.0087	-.124	0.0	0.0	.0087	
0									
	0.0	.0149	0.0	0.0	0.0	-.124	0.0	0.0	
0									
	0.0	0.0	.0149	0.0	0.0	0.0	-.124	0.0	
0									
30	.0149	0.0	0.0	.0087	.0126	0.0	0.0	-.128	
0									
75	.00915	0.0	0.0	.00459	.00885	0.0	0.0	.00459	High income price response coefficients - institutional sector by institutional sector
0									
579	-.071	0.0	0.0	.00459	.00885	0.0	0.0	.00459	
0									
	0.0	-.071	0.0	0.0	0.0	.00885	0.0	0.0	
0									
	0.0	0.0	-.071	0.0	0.0	0.0	.00885	0.0	
0									
579	.00915	0.0	0.0	-.076	.00885	0.0	0.0	.00459	
0									
579	.00915	0.0	0.0	.00459	-.071	0.0	0.0	.00459	
0									
	0.0	.00915	0.0	0.0	0.0	-.071	0.0	0.0	
0									
	0.0	0.0	.00915	0.0	0.0	0.0	-.071	0.0	
0									
579	.00915	0.0	0.0	.00459	.00885	0.0	0.0	-.076	
0									
000	2000	3000	4000	5000	6000	7500	10000	15000	25000999999 Income category upper bounds
0									

E-6 provide users with enough information to determine which elements to change for specific purposes.

4. FORTRAN Programs

Complete listings of the three FORTRAN programs (INPT, MDL, and RPT) are given in Appendix F. The programs are not documented with "COMMENT" statements to any degree, so it will be very difficult for a user to attempt modification of the programs without a great deal of effort.

5. Illustrative Run of the Model

The following description of using the model is based on an actual run of the model on the SDC computer utilizing the TSO system. The printout shown in Table E-7 is the response that a user obtains by inputting the following instruction:

```
EXECUTE    NCFPE.CROSS.MODEL
```

This statement tells the computer to execute the control list (CLIST) shown in Table E-2. Table E-7 then displays the entire input phase of the model or the dialog between the program and the user. All of the policy parameters are entered into the model in this dialog format. The symbol ">" in Table E-7 is placed on the left hand edge of each line typed in by the user; those lines without ">" indicate the model's response to the user at the terminal.

The basic input instructions are provided to the user at the beginning of each run as shown in Table E-7. Since the policy parameters are inputted in a question/answer format, reading through Table E-7 provides sufficient explanation of the requirements upon the user for setting up a run to analyze a specific financing proposal.

All of the possible output tables resulting from the model's calculations are listed in Table E-8. These tables provide considerable detail on the enrollment and financial impacts of the particular financing policy being analyzed. Because of the time required for

Table E-7: Illustrative Input Dialog For A Model Run

```
NCFP03              NATIONAL COMMISSION ON THE FINANCING          04/27/74
VERSION  1.2              OF POSTSECONDARY EDUCATION              14.27.28

        THIS MODEL ON THE FINANCING OF POSTSECONDARY EDUCATION
        WAS DEVELOPED BY THE NCFPE STAFF TO SUPPORT ITS
        ANALYSIS.  IN ADDITION TO THE INPUT PROVIDED BY THE
        USER, THERE ARE FILES OF EXTERNAL VARIABLES
        REPRESENTING DATA ON CURRENT AND PROJECTED ENROLLMENTS,
        FUNDING PATTERNS, AND STUDENT PRICE RESPONSE
        COEFFICIENTS.  ALSO THERE ARE ASSUMPTIONS INHERENT IN
        THE MODEL ITSELF.  USERS SHOULD BE AWARE OF THE UNDER-
        LYING ASSUMPTIONS BEFORE USING THE MODEL.

    BASIC INPUT INSTRUCTIONS:
      (1) VARIABLES SHOULD BE ENTERED AFTER THE "?" WITHOUT
          COMMAS AND WITH ONE OR MORE SPACES BETWEEN VALUES.
      (2) TERMINATING ANY LINE OF VALUES WITH A "/" PROVIDES
          ZERO VALUES FOR ANY REMAINING VARIABLES.
      (3) FOR THOSE VARIABLES REQUIRING A SEQUENCE OF LINE
          ENTRIES, THE SEQUENCE  SHOULD BE TERMINATED WITH A
          "0/" AS THE FIRST VALUE.
      (4) NEGATIVE NUMBERS SHOULD HAVE A LEADING MINUS SIGN
          WITHOUT A SPACE.


NTER A "1" IF THIS RUN IS A COMPLETELY NEW POLICY ALTERNATIVE
NTER A "2" IF THIS RUN IS A CHANGE GO THE PREVIOUS RUN


NTER NAME OF POLICY ALTERNATIVE          I
        (UP TO 40 CHARACTERS)            I
LAN H - (RERUN)
NTER EXPANDED DESCRIPTION OF POLICY ANALYSIS                          I
        (12 LINES OF 72 CHARACTERS)                                   I
```

(Table E-7, continued)

```
 ENTER NUMBER OF YEARS (MAX = 3) TO BE
 ANALYZED AND THE YEARS (19XX)
  ?
>1 1977
  ?
>/
 ENTER CUTOFF LEVEL OF INCOME FOR ACCESS ANALYSIS
  ?
>15000
 ENTER TUITION LEVELS
 INSTITUTIONAL CATEGORY (1-9), PERCENT OF TUITION INCREASE
 GOING TO STUDENT AID, YEAR1 (19XX),TUITION IN $S, YEAR2,
 TUITION IN $S, YEAR3, TUITION IN $S
  ?
>0/
 ENTER FEDERAL INSTITUTIONAL AID
 INSTITUTIONAL CATEGORY, CODE (0=LUMP, 1=CAPITATION,
 2=PER STUDENT AIDED), YEAR 1, DOLLARS, YEAR 2, DOLLARS,
 YEAR 3, DOLLARS
  ?
>1 2 1977 400/
  ?
>2 2 1977 400/
  ?
>3 2 1977 400/
  ?
>5 2 1977 400/
  ?
>6 2 1977 400/
  ?
>7 2 1977 400/
  ?
>0/
 ENTER STATE INSTITUTIONAL AID
 INSTITUTIONAL CATEGORY, CODE (0=LUMP, 1=CAPITATION,
 2=PER STUDENT AIDED), YEAR 1, DOLLARS, YEAR 2, DOLLARS,
 YEAR 3, DOLLARS
  ?
>1 0 1977 24900000/
  ?
>2 0 1977 28350000/
  ?
>3 0 1977 23550000/
  ?
>4 0 1977 15150000/
  ?
>5 0 1977 1800000/
  ?
>6 0 1977 13200000/
  ?
>7 0 1977 10050000/
  ?
>8 0 1977 8100000/
  ?
>9 0 1977 24900000/
  ?
>0/
```

(Table E-7, continued)

```
 ENTER LOCAL INSTITUTIONAL AID
 INSTITUTIONAL CATEGORY, CODE (0=LUMP, 1=CAPITATION,
 2=PER STUDENT AIDED), YEAR 1, DOLLARS, YEAR 2, DOLLARS,
 YEAR 3, DOLLARS
 ?
>0/
 ENTER FEDERAL STUDENT AID LEVELS
 YEAR (19XX), DOLLARS OF AID, INCOME CUTOFF LEVEL, INSTITUTIONAL CATEGORI
 UP TO 9 ENTRIES)
 ?
>1977 1600000000 15000 1 2 3 5 6 7 9/
 ?
>0/
 ENTER STATE STUDENT AID LEVELS
 YEAR (19XX), DOLLARS OF AID, INCOME CUTOFF LEVEL, INSTITUTIONAL CATEGORI
 UP TO 9 ENTRIES)
 ?
>1977 100000000 15000 1 2 3 5 6 7 9/
 ?
>0/
 ENTER FEDERAL ASSISTANCE TO STATES
 YEAR1, FEDERAL $S, YEAR2, FEDERAL $S, YEAR3, FEDERAL $S
 ?
>1977 50000000/
 ENTER FEDERAL ASSISTANCE TO LOCAL GOVERNMENTS
 YEAR1,FEDERAL $S, YEAR2,FEDERAL $S, YEAR3,FEDERAL $S
 ?
>0/
 ENTER LIST OF TABLES TO BE PRINTED (1-11) IN ORDER DESIRED
 ?
>1 2 3 4 5 6 7 8 9 10 11/
 THANK YOU FOR THE ENJOYABLE INPUT - PLEASE ENTER
 YOUR INITIALS FOR RUN IDENTIFICATION
>DEC
 ------------------------------------------------------------------------
 THE INPUT STAGE OF THIS ANALYSIS IS NOW COMPLETE


 NCFP03 I  EXECUTION OF MDL.FORT BEGINNING
 NCFP03 I  EXECUTION OF MDL.FORT COMPLETED
 NCFP05 A  SET ONE SPACE ABOVE TOP OF PAGE, CARRIAGE RETURN FOR OUTPUT
>
```

Table E-8: Complete Listing of Output Tables

ANALYSIS OF PLAN H - (RERUN)
FOR YEARS 1977, 0, 0

THE FOLLOWING TABLES PRESENT AN ANALYSIS OF THE ALTERNATIVE FINANCING PROPOSAL IDENTIFIED ABOVE. A COMMON SET OF BASE DATA IS USED (FOR COMPARATIVE PURPOSES) IN THE ESTIMATION OF THE ENROLLMENT AND FINANCIAL IMPLICATIONS OF EACH ALTERNATIVE. THESE "BASELINE" DATA ARE SHOWN IN THE FOLLOWING TABLES FOR COMPARATIVE PURPOSES. IN ADDITION, THE PLAN H - (RERUN) PROPOSAL INCLUDES THE FOLLOWING POLICY ASSUMPTIONS AND WOULD RESULT IN THE FOLLOWING IMPACTS:

	1977	0	0
FINANCING CHANGES:			
FEDERAL STUDENT AID	1600000000.	0.	0.
MAX ELIGIBLE FAMILY INCOME	15000.	0.	0.
STATE STUDENT AID	100000000.	0.	0.
MAX ELIGIBLE FAMILY INCOME	15000.	0.	0.
FEDERAL INSTITUTIONAL AID (PER STUDENT AIDED)	400.	0.	0.
STATE INSTITUTIONAL AID (BLOCK GRANT)	150000000.	0.	0.
TUITION AT PUBLIC INSTITUTIONS	467.	0.	0.
FEDERAL AID TO STATES	50000000.	0.	0.
FEDERAL AID TO LOCAL GOV	0.	0.	0.
SUMMARY IMPACT MEASURES:			
PERCENT CHANGES FROM BASE ENROLLMENT			
PUBLIC 2 YR COLLEGES	-1.14	0.0	0.0
PUBLIC 4 YR COLLEGES	1.03	0.0	0.0
PRIVATE COLLEGES, ALL	5.28	0.0	0.0
NONCOLLEGIATE	5.69	0.0	0.0
UNDERGRADUATE, UNDER $10,000	6.33	0.0	0.0
UNDERGRADUATE, $10-14,999	1.04	0.0	0.0
UNDERGRADUATE, $15,000 & OVER	0.0	0.0	0.0
AVERAGE U.G. GRANT INCREASE- $	158.53	0.0	0.0

(Table E-8, continued)

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ANALYSIS OF PLAN H - (RERUN)

TABLE 1 - SUMMARY

	1977	0	0
I. PROPOSED POLICY CHANGES			
ADDITIONAL STUDENT AID, FEDERAL	1600000000.	0.	0.
MAXIMUM ELIGIBLE FAMILY INCOME	15000.	0.	0.
ADDITIONAL STUDENT AID, STATE	100000000.	0.	0.
MAXIMUM ELIGIBLE FAMILY INCOME	15000.	0.	0.
ADDITIONAL INSTITUTIONAL AID,FEDERAL (PER STUDENT AIDED)	400.	0.	0.
ADDITIONAL INSTITUTIONAL AID, STATE (BLOCK GRANT)	150000000.	0.	0.
FEDERAL TRANSFERS, LOCAL GOVERNMENT	0.	0.	0.
FEDERAL TRANSFERS, STATE GOVERNMENT	50000000.	0.	0.
♦ TOTAL FEDERAL TRANSFERS	50000000.	0.	0.
AVERAGE TUITION BEFORE STUDENT AID			
PUBLIC 2 YEAR	192.	0.	0.
PUBLIC 4 YEAR, LOWER DIVISION	583.	0.	0.
PUBLIC 4 YEAR, UPPER DIVISION	583.	0.	0.
PUBLIC 4 YEAR, GRADUATE	583.	0.	0.
PRIVATE, UNDERGRADUATE	2039.	0.	0.
PRIVATE, GRADUATE	2039.	0.	0.
NONCOLLEGIATE	1326.	0.	0.
II. PROJECTED PERCENT CHANGES FROM FORECAST ENROLLMENT			
PUBLIC 2 YEAR	-1.14 %	0.0 %	0.0 %
PUBLIC 4 YEAR, LOWER DIVISION	0.82 %	0.0 %	0.0 %
PUBLIC 4 YEAR, UPPER DIVISION	1.97 %	0.0 %	0.0 %
PUBLIC 4 YEAR, GRADUATE	0.0 %	0.0 %	0.0 %
PRIVATE, UNDERGRADUATE	7.13 %	0.0 %	0.0 %
PRIVATE, GRADUATE	0.0 %	0.0 %	0.0 %
NONCOLLEGIATE	5.69 %	0.0 %	0.0 %
UNDERGRADUATE, LESS THAN $10,000	6.33 %	0.0 %	0.0 %
UNDERGRADUATE, $10,000 TO $14,999	1.04 %	0.0 %	0.0 %
UNDERGRADUATE, $15,000 AND OVER	0.0 %	0.0 %	0.0 %
III. PROJECTED FINANCING CHANGES			
TOTAL INCREMENTAL COST, FEDERAL	3508513280.	0.	0.
TOTAL INCREMENTAL COST, STATE	243850160.	0.	0.
TOTAL INCREMENTAL COST, LOCAL	198858.	0.	0.
♦ TOTAL GOVERNMENTAL INCRMNTAL COST	3752561920.	0.	0.
TOTAL INCREMENTAL COST, PRIVATE	105223296.	0.	0.
TOTAL INCREMENTAL COST, FAMILY & STU	388719616.	0.	0.
♦♦ TOTAL INCREMENTAL COST	4246504700.	0.	0.
ADD TUITION REVENUE FOR STUDENT AID	0.	0.	0.
IV. PROJECTED COST PER ADDITIONAL STUDENT			
COST BORNE BY FEDERAL GOVERNMENT	7789.	0.	0.
COST BORNE BY STATE GOVERNMENTS	541.	0.	0.
COST BORNE BY LOCAL GOVERNMENTS	0.	0.	0.
COST BORNE BY STUDENT AND FAMILY	863.	0.	0.
COST FROM PRIVATE SOURCES OF FUNDS	234.	0.	0.
♦♦ TOTAL COST PER ADDITIONAL STUDENT	9427.	0.	0.

(Table E-8, continued)

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ANALYSIS OF PLAN H - (RERUN)
FOR YEARS 1977, 0, 0

TABLE 2A

---MEASURES---	---------BASELINE----------			--------ALTERNATIVE--------		
	1977	0	0	1977	0	0
ENROLLMENT						
PUBLIC 2 YR	1989999.	0.	0.	1967250.	0.	0.
PUBLIC 4 YR						
LOWER DIV	1856799.	0.	0.	1872047.	0.	0.
UPPER DIV	1666478.	0.	0.	1699255.	0.	0.
GRADUATE	1118719.	0.	0.	1118719.	0.	0.
• SUBTOTAL	6631995.	0	0.	6657271.	0.	0.
PRIVATE 2YR	97000.	0.	0.	104507.	0.	0.
PRIVATE 4YR						
LOWER DIV	849455.	0.	0.	905975.	0.	0.
UPPER DIV	666240.	0.	0.	717240.	0.	0.
GRADUATE	566305.	0.	0.	566305.	0.	0.
• SUBTOTAL	2178998.	0.	0.	2294026.	0.	0.
NONCOLLEGIATE	1731997.	0.	0.	1830482.	0.	0.
•• TOTAL	10542988.	0.	0.	10781779.	0.	0.

TABLE 2B

---MEASURES---	---------BASELINE----------			--------ALTERNATIVE--------		
	1977	0	0	1977	0	0
PERCENT OF ENROLLMENT BELOW INCOME LEVEL - $ 15000						
PUBLIC 2 YR	72.20	0.0	0.0	71.88	0.0	0.0
PUBLIC 4 YR						
LOWER DIV	64.60	0.0	0.0	64.89	0.0	0.0
UPPER DIV	64.60	0.0	0.0	65.28	0.0	0.0
GRADUATE	61.80	0.0	0.0	61.80	0.0	0.0
• AVERAGE	66.41	0.0	0.0	66.54	0.0	0.0
PRIVATE 2YR	65.30	0.0	0.0	67.79	0.0	0.0
PRIVATE 4YR						
LOWER DIV	57.10	0.0	0.0	59.78	0.0	0.0
UPPER DIV	57.10	0.0	0.0	60.15	0.0	0.0
GRADUATE	55.20	0.0	0.0	55.20	0.0	0.0
• AVERAGE	56.97	0.0	0.0	59.13	0.0	0.0
NONCOLLEGIATE	76.10	0.0	0.0	77.39	0.0	0.0
•• AVERAGE	66.05	0.0	0.0	66.80	0.0	0.0

(Table E-8, continued)

ANALYSIS OF PLAN H - (RERUN)
FOR YEARS 1977, 0, 0

TABLE 3A

---MEASURES---	---------BASELINE----------			--------ALTERNATIVE--------		
	1977	0	0	1977	0	0
AVERAGE GROSS TUITION PER STUDENT (BEFORE STUDENT AID)						
PUBLIC 2 YR	192.	0.	0.	192.	0.	0.
PUBLIC 4 YR						
LOWER DIV	583.	0.	0.	583.	0.	0.
UPPER DIV	583.	0.	0.	583.	0.	0.
GRADUATE	583.	0.	0.	583.	0.	0.
* AVERAGE	466.	0.	0.	467.	0.	0.
PRIVATE 2YR	2039.	0.	0.	2039.	0.	0.
PRIVATE 4YR						
LOWER DIV	2039.	0.	0.	2039.	0.	0.
UPPER DIV	2039.	0.	0.	2039.	0.	0.
GRADUATE	2039.	0.	0.	2039.	0.	0.
* AVERAGE	2039.	0.	0.	2039.	0.	0.
NONCOLLEGIATE	1326.	0.	0.	1326.	0.	0.
** AVERAGE	932.	0.	0.	948.	0.	0.

TABLE 3B

---MEASURES---	---------BASELINE----------			--------ALTERNATIVE--------		
	1977	0	0	1977	0	0
AVERAGE NET TUITION PER STUDENT (AFTER STUDENT AID)						
PUBLIC 2 YR	158.	0.	0.	119.	0.	0.
PUBLIC 4 YR						
LOWER DIV	420.	0.	0.	311.	0.	0.
UPPER DIV	420.	0.	0.	309.	0.	0.
GRADUATE	420.	0.	0.	420.	0.	0.
* AVERAGE	341.	0.	0.	272.	0.	0.
PRIVATE 2YR	1641.	0.	0.	1201.	0.	0.
PRIVATE 4YR						
LOWER DIV	1641.	0.	0.	1273.	0.	0.
UPPER DIV	1641.	0.	0.	1267.	0.	0.
GRADUATE	1641.	0.	0.	1641.	0.	0.
* AVERAGE	1641.	0.	0.	1359.	0.	0.
NONCOLLEGIATE	1326.	0.	0.	1001.	0.	0.
** AVERAGE	663.	0.	0.	550.	0.	0.

(Table E-8, continued)

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ANALYSIS OF PLAN H - (RERUN)
FOR YEARS 1977, 0, 0

TABLE 4A

---MEASURES---	---------BASELINE----------			--------ALTERNATIVE--------		
	1977	0	0	1977	0	0
UNDERGRADUATE ENROLLMENT, ALL INSTITUTIONS, BY FAMILY INCOME						
$ 0 - 999	62150.	0.	0.	71694.	0.	0.
$ 1,000- 1,999	128868.	0.	0.	157584.	0.	0.
$ 2,000- 2,999	194735.	0.	0.	226716.	0.	0.
$ 3,000- 3,999	311108.	0.	0.	344363.	0.	0.
$ 4,000- 4,999	392587.	0.	0.	419874.	0.	0.
$ 5,000- 5,999	403788.	0.	0.	431321.	0.	0.
$ 6,000- 7,499	644250.	0.	0.	680369.	0.	0.
$ 7,500- 9,999	1206626.	0.	0.	1223867.	0.	0.
$10,000-14,999	2615554.	0.	0.	2642667.	0.	0.
$15,000-24,999	2009356.	0.	0.	2009356.	0.	0.
$25,000- OVER	888942.	0.	0.	888942.	0.	0.
** TOTAL	8857963.	0.	0.	9096752.	0.	0.

TABLE 4B

---MEASURES---	-------ALTERNATIVE---------			-------ALTERNATIVE--------		
	1977	0	0	1977	0	0
	AID INCREASE PER STUDENT BY FAMILY INCOME			NET TUITION INCREASE PER STUDENT BY FAMILY INCOME		
$ 0 - 999	753.	0.	0.	0.	0.	0.
$ 1,000- 1,999	985.	0.	0.	0.	0.	0.
$ 2,000- 2,999	732.	0.	0.	0.	0.	0.
$ 3,000- 3,999	489.	0.	0.	0.	0.	0.
$ 4.000- 4,999	319.	0.	0.	0.	0.	0.
$ 5,000- 5,999	292.	0.	0.	0.	0.	0.
$ 6,000- 7,499	246.	0.	0.	0.	0.	0.
$ 7,500- 9,999	178.	0.	0.	0.	0.	0.
$10,000-14,999	122.	0.	0.	0.	0.	0.
$15,000-24,999	0.	0.	0.	0.	0.	0.
$25,000- OVER	0.	0.	0.	0.	0.	0.
** AVERAGE	159.	0.	0.	0.	0.	0.

(Table E-8, continued)

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ANALYSIS OF PLAN H - (RERUN)
FOR YEARS 1977, 0, 0

TABLE 5A

---MEASURES---	--------ALTERNATIVE-------- 1977	0	0
NET PRICE PER STUDENT BY FAMILY INCOME			
$ 0 - 999	-753.	0.	0.
$ 1,000- 1,999	-985.	0.	0.
$ 2,000- 2,999	-732.	0.	0.
$ 3,000- 3,999	-489.	0.	0.
$ 4,000- 4,999	-319.	0.	0.
$ 5,000- 5,999	-292.	0.	0.
$ 6,000- 7,499	-246.	0.	0.
$ 7,500- 9,999	-178.	0.	0.
$10,000-14,999	-122.	0.	0.
$15,000-24,999	0.	0.	0.
$25,000- OVER	0.	0.	0.
** AVERAGE	-166.	0.	0.

TABLE 5B

---MEASURES---	--------ALTERNATIVE-------- 1977	0	0
COST PER ADDITIONAL STUDENT			
FEDERAL GOVERNMENT	7789.	0.	0.
STATE GOVERNMENTS	541.	0.	0.
LOCAL GOVERNMENTS	0.	0.	0.
STUDENT AND FAMILY FUNDS	863.	0.	0.
PRIVATE SOURCES OF FUNDS	234.	0.	0.
** TOTAL	9427.	0.	0.

(Table E-8, continued)

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ANALYSIS OF PLAN H - (RERUN)
FOR YEAR 1977

TABLE 6

FROM:	FEDERAL	STATE	LOCAL	STUDENT	PRIVATE
DIRECT PUBLIC FUNDING DECISIONS					
TO:					
UNDERGRADUATE					
LT $15000.	1600000000.	100000000.	0.	0.	0.
GE $15000.	0.	0.	0.	0.	0.
GRADUATE	0.	0.	0.	0.	0.
ALL STUDENTS	0.	0.	0.	0.	0.
PUBLIC 2 YR	565611776.	24900000.	0.	0.	0.
PUBLIC 4 YR	929624576.	67050000.	0.	0.	0.
PRIVATE	417532160.	33150000.	0.	0.	0.
NONCOLLEGTE	0.	24900000.	0.	0.	0.
FEDERAL AID TO:					
STATE GOV	50000000.	-50000000.	0.	0.	0.
LOCAL GOV	0.	0.	0.	0.	0.
COST INDUCED BY ENROLLMENT CHANGES					
TO:					
UNDERGRADUATE					
LT $15000.	0.	0.	0.	0.	0.
GE $15000.	0.	0.	0.	0.	0.
GRADUATE	0.	0.	0.	0.	0.
ALL STUDENTS	0.	0.	0.	0.	0.
PUBLIC 2 YR	-4255001.	-36249456.	-89979.	-4372850.	-308926.
PUBLIC 4 YR	3950230.	97149616.	25737.	28012304.	1797296.
PRIVATE	11360894.	27637872.	263100.	234524928.	103734928.
NONCOLLEGTE	0.	0.	0.	130555408.	0.
FEDERAL AID TO:					
STATE GOV	0.	0.	0.	0.	0.
LOCAL GOV	0.	0.	0.	0.	0.
NET CHANGE IN FUNDING					
TO:					
UNDERGRADUATE					
LT $15000.	1600000000.	100000000.	0.	0.	0.
GE $15000.	0.	0.	0.	0.	0.
GRADUATE	0.	0.	0.	0.	0.
ALL STUDENTS	0.	0.	0.	0.	0.
PUBLIC 2 YR	561356544.	-11349456.	-89979.	-4372850.	-308926.
PUBLIC 4 YR	929624576.	97149616.	25737.	28012304.	1797296.
PRIVATE	417532160.	33150000.	263100.	234524928.	103734928.
NONCOLLEGTE	0.	24900000.	0.	130555408.	0.
FEDERAL AID TO:					
STATE GOV	50000000.	-50000000.	0.	0.	0.
LOCAL GOV	0.	0.	0.	0.	0.

printing all of these tables, an option for requesting a subset of the tables was included in the program. The user input required for this option is shown towards the end of Table E-7. Even when only a subset is requested, page 1 of the output is always printed, and the National Commission's staff usually requested Table 1 on page 2. These two pages provide a good summary of the impacts and require a short printing time. It should be noted that the output phase of the program requires no additional input from the user. Hence, Table E-8 is all printout from the RPT program, with no user interaction shown.

6. Precautions in Using the Model

Potential users of the model are urged to read Chapter 3 of the text very carefully and to understand fully all of the assumptions, explicit and implicit, of the model. Also, the sources of the exogenous data utilized by the model should be reexamined. The user must be sure that the logic and assumptions of the model and the data used are consistent with his or her decisions about financial aid for students and institutions, and about tuition policies for postsecondary education.

7. Summary of Possible Analyses

The model as it currently exists can support a wide variety of policy analyses. Two broad categories of possible uses are these:

(1) analyses requiring use of the interactive input feature only; or
(2) analyses requiring changes in data elements.

Within the first category of analyses, several types of policy parameter variations can be studied. Chapter 4 of the text discusses the analyses performed by the Commission staff. These analyses included:

(a) Variations in tuition, student aid, and institutional support policy combinations;
(b) Variations in the total number of dollars being provided to postsecondary education from public sources;

(c) Sensitivity of enrollment and financial impact measures to changes in key elements of financing policies (while holding all other factors constant). For example, the effects of variations in student aid eligibility cutoff levels or variations in the proportion of additional tuition revenues going to student aid can be evaluated.

The second category of analyses result from making changes in the data files, BASELINE and EXOVAR. Examples of such analyses are these:

(a) Sensitivity analyses for changes in the price response coefficients;

(b) Sensitivity analyses for changes in baseline enrollment projections;

(c) Sensitivity analyses for changes in institutional costs per student.

```
      IMPLICIT INTEGER(A-Z)                                                  00000020
      DIMENSION TIME(2),DATE(2),IARRAY(8),XXTUIT(9,13)                       00000040
      DIMENSION PRISA(9,13),PRICUT(9,13),AVECST(9,13),TPRC(9)                00000060
      DIMENSION RNAME(10),DESCRP(18,12),IDATA(12),TUITNW(9,13)               00000080
      DIMENSION IVC(9),FEDSTA(13),FEDLOC(13),PRIINS(9,13),IPAG(20)           00000100
      DIMENSION FEDSA(9,13), FEDCUT(9,13), STASA(9,13), STACUT(9,13)         00000120
      DIMENSION FEDINS(9,13), STAINS(9,13),LOCINS(9,13),CODE(9,3)            00000140
      DIMENSION XNAME(10),XESCRP(18,12),XUITNW(9,13),XEDINS(9,13),           00000160
     1 XTAINS(9,13),XOCINS(9,13),XEDSA(9,13),XEDCUT(9,13),                   00000180
     2 XTASA(9,13),XTACUT(9,13),XEDSTA(13),XEDLOC(13),XRIINS(9,13),          00000200
     3 XRISA(9,13),XRICUT(9,13),XVECST(9,13),XODE(9,3),XPRC(9),              00000220
     4 XPAG(20)                                                              00000240
      REAL TUITNW, FEDINS, STAINS, LOCINS, FEDSA, FEDCUT, STASA, STACUT      00000260
      REAL RNAME,DESCRP,FEDSTA,FEDLOC,PRTCUT,INFLAT,XXTUIT                   00000280
      REAL PRICUT,AVECST,PRIINS,PRISA,TPRC,VERSN,INIT,IDATA                  00000300
      REAL XNAME,XESCRP,XUITNW,XEDINS,XTAINS,XOCINS,XEDSA,                   00000320
     1 XEDCUT,XTASA,XTACUT,XEDSTA,XEDLOC,XRTACT,XRIINS,                      00000340
     2 XRISA,XRICUT,XVECST,XPRC,XERSN,XINIT                                  00000360
      DATA BLNK/1H /,INFLAT/1.058/,YEAR2/0/,YEAR3/0/,BLAK/4H    /            00000380
      DATA YEAR1/1973/                                                       00000400
      DO 340 I=1,20                                                          00000420
340   IPAG(I)=0                                                              00000440
      PRC=0                                                                  00000460
      PRTCUT=0.0                                                             00000480
      CALL DATIME(2,IARRAY)                                                  00000500
      VERSN=1.2                                                              00000520
      TIME(1)=IARRAY(3)                                                      00000540
      TIME(2)=IARRAY(4)                                                      00000560
      DATE(1)=IARRAY(1)                                                      00000580
      DATE(2)=IARRAY(2)                                                      00000600
      INIT=BLAK                                                              00000620
      DO 301 I=1,10                                                          00000640
301   RNAME(I)=BLNK                                                          00000660
      DO 302 I=1,18                                                          00000680
      DO 302 J=1,6                                                           00000700
302   DESCRP(I,J)=BLNK                                                       00000720
      WRITE(6,10) DATE,VERSN,TIME                                            00000740
10    FORMAT(1X,'NCFP03',12X,'NATIONAL COMMISSION ON THE FINANCING',         00000760
     1 10X,2A4,/,1X,'VERSION ',F4.1,12X,'OF POSTSECONDARY EDUCATION',        00000780
     2 14X,2A4,/,/,10X,                                                      00000800
     3 'THIS MODEL ON THE FINANCING OF POSTSECONDARY EDUCATION',/,10X,       00000820
     4 'WAS DEVELOPED BY THE NCFPE STAFF TO SUPPORT ITS',/,10X,              00000840
     5 'ANALYSIS.  IN ADDITION TO THE INPUT PROVIDED BY THE',/,10X,          00000860
     6 'USER, THERE ARE FILES OF EXTERNAL VARIABLES',/,10X,                  00000880
     7 'REPRESENTING DATA ON CURRENT AND PROJECTED ENROLLMENTS,',/,10X,      00000900
     8 'FUNDING PATTERNS, AND STUDENT PRICE RESPONSE',/,10X,                 00000920
     9 'COEFFICIENTS.  ALSO THERE ARE ASSUMPTIONS INHERENT IN ')             00000940
      WRITE(6,183)                                                           00000960
183   FORMAT(10X,                                                            00000980
     1 'THE MODEL ITSELF.  USERS SHOULD BE AWARE OF THE UNDER-',/,10X,       00001000
     2 'LYING ASSUMPTIONS BEFORE USING THE MODEL.',/,/,5X,                   00001020
     3 'BASIC INPUT INSTRUCTIONS:',/,7X,                                     00001040
     4 '(1) VARIABLES SHOULD BE ENTERED AFTER THE "?" WITHOUT',/,10X,        00001060
     5 'COMMAS AND WITH ONE OR MORE SPACES BETWEEN VALUES.',/,7X,            00001080
     6 '(2) TERMINATING ANY LINE OF VALUES WITH A "/" PROVIDES',/,10X,       00001100
     7 'ZERO VALUES FOR ANY REMAINING VARIABLES.',/,7X,                      00001120
     8 '(3) FOR THOSE VARIABLES REQUIRING A SEQUENCE OF LIKE',/,10X,         00001140
     9 'ENTRIES, THE SEQUENCE  SHOULD BE TERMINATED WITH A',/,10X,           00001160
     1 '"0/" AS THE FIRST VALUE.',/,7X,                                      00001180
```

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     2 '(4) NEGATIVE NUMBERS SHOULD HAVE A LEADING MINUS SIGN',/,10X,    00001200
     3 'WITHOUT A SPACE.',/,/,/)                                         00001220
      WRITE(6,500)                                                       00001240
500   FORMAT(1X,'ENTER A "1" IF THIS RUN IS A ',                         00001260
     1 'COMPLETELY NEW POLICY ALTERNATIVE',/,1X,                         00001280
     2 'ENTER A "2" IF THIS RUN IS A CHANGE GO THE PREVIOUS RUN')        00001300
      READ(5,*) RCA                                                      00001320
      IF(RCA.EQ.2) WRITE(6,501)                                          00001340
501   FORMAT(1X,'ENTER A "1" IF THE CHANGES ARE INCREMENTAL',/,          00001360
     1 1X,'ENTER A "2" IF THE CHANGES ARE ABSOLUTE')                     00001380
      IF(RCA.EQ.2) READ(5,*) RCB                                         00001400
      WRITE(6,182)                                                       00001420
182   FORMAT(1X,'ENTER NAME OF POLICY ALTERNATIVE',7X,'I',/,11X,         00001440
     1 '(UP TO 40 CHARACTERS)',8X,'I')                                   00001460
      READ(5,60) (RNAME(I),I=1,10)                                       00001480
60    FORMAT(10A4)                                                       00001500
      WRITE(6,11)                                                        00001520
11    FORMAT(1HO,'ENTER EXPANDED DESCRIPTION OF POLICY ANALYSIS',        00001540
     1 26X,'I',/,11X,'(12 LINES OF 72 CHARACTERS)',34X,'I')              00001560
      READ(5,61) ((DESCRP(I,J),I=1,18),J=1,12)                           00001580
 61   FORMAT(18A4,/,18A4,/,10(18A4,/))                                   00001600
      WRITE(6,300)                                                       00001620
300   FORMAT(1X,'ENTER NUMBER OF YEARS (MAX = 3) TO BE',/,1X,            00001640
     1 'ANALYZED AND THE YEARS (19XX)')                                  00001660
      READ(5,*) NUMYR,YEAR1,YEAR2,YEAR3,PRC                             00001680
      YEAR1=YEAR1-1973                                                   00001700
      YEAR2=YEAR2-1973                                                   00001720
      YEAR3=YEAR3-1973                                                   00001740
      WRITE(6,12)                                                        00001760
 12   FORMAT(1HO,'ENTER CUTOFF LEVEL OF INCOME FOR',                     00001780
     1' ACCESS ANALYSIS')                                                00001800
      READ(5,*) PRTCUT                                                   00001820
      READ(2,305) (TUITNW(I,13), I=1,9)                                  00001840
 305  FORMAT(9F7.0)                                                      00001860
      READ(2,306) (FEDINS(I,13), I=1,9)                                  00001880
 306  FORMAT(5F12.0,/,4F12.0)                                            00001900
      READ(2,306) (STAINS(I,13), I=1,9)                                  00001920
      READ(2,306) (LOCINS(I,13), I=1,9)                                  00001940
      READ(2,306) (PRIINS(I,13),I=1,9)                                   00001960
      READ(2,306) (FEDSA(I,13), I=1,9)                                   00001980
      READ(2,306) (STASA(I,13), I=1,9)                                   00002000
      READ(2,306) (PRISA(I,13),I=1,9)                                    00002020
      READ(2,306) (FEDCUT(I,13), I=1,9)                                  00002040
      READ(2,306) (STACUT(I,13), I=1,9)                                  00002060
      READ(2,306) (PRICUT(I,13),I=1,9)                                   00002080
      READ(2,306) FEDSTA(13), FEDLOC(13)                                 00002100
      READ(2,306) (AVECST(I,13),I=1,9)                                   00002120
      DO 307 I=1,9                                                       00002140
      TPRC(I)=0.0                                                        00002160
      CODE(I,1)=0                                                        00002180
      CODE(I,2)=0                                                        00002200
      CODE(I,3)=0                                                        00002220
      DO 307 J=1,13                                                      00002240
      TUITNW(I,J)=TUITNW(I,13)*(INFLAT**(J+1))                           00002260
      FEDINS(I,J)=0.0                                                    00002280
      XXTUIT(I,J)=0.0                                                    00002300
      STAINS(I,J)=0.0                                                    00002320
      LOCINS(I,J)=0.0                                                    00002340
      PRIINS(I,J)=0.0                                                    00002360
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      FEDSA(I,J)=0.0                                                    00002380
      STASA(I,J)=0.0                                                    00002400
      PRISA(I,J)=0.0                                                    00002420
      FEDCUT(I,J)=0.0                                                   00002440
      STACUT(I,J)=0.0                                                   00002460
      PRICUT(I,J)=0.0                                                   00002480
      AVECST(I,J)=AVECST(I,13)*(INFLAT**(J+1))                          00002500
  307 CONTINUE                                                          00002520
      DO 308 I=1,13                                                     00002540
      FEDSTA(I)=0.0                                                     00002560
  308 FEDLOC(I)=0.0                                                     00002580
   15 WRITE(6,13)                                                       00002600
   13 FORMAT(1X,'ENTER TUITION LEVELS',/,1X,                            00002620
     1 'INSTITUTIONAL CATEGORY (1-9), PERCENT OF TUITION INCREASE',     00002640
     2 /,1X,'GOING TO STUDENT AID, YEAR1 (19XX),TUITION IN $S, YEAR2,', 00002660
     3 /,1X,'TUITION IN $S, YEAR3, TUITION IN $S')                      00002680
  159 DO 100 I=1,6                                                      00002700
  100 IDATA(I)=1986                                                     00002720
      READ(5,*) ICAT,DUM,IDATA(1),IDATA(2),IDATA(3),IDATA(4),           00002740
     1 IDATA(5),IDATA(6)                                                00002760
      IF(ICAT.LE.0) GO TO 14                                            00002780
      DO 16 I=1,6,2                                                     00002800
      N=IFIX(IDATA(I))-1973                                             00002820
      TPRC(ICAT)=FLOAT(DUM)/100.0                                       00002840
      XXTUIT(ICAT,N)=IDATA(I+1)                                         00002860
   16 TUITNW(ICAT,N)=IDATA(I+1)                                         00002880
      GO TO 159                                                         00002900
   14 WRITE(6,22)                                                       00002920
   22 FORMAT(1HO,'ENTER FEDERAL INSTITUTIONAL AID',/,1X,                00002940
     1 'INSTITUTIONAL CATEGORY, CODE (0=LUMP, 1=CAPITATION,',/,         00002960
     2 1X,'2=PER STUDENT AIDED), YEAR 1, DOLLARS, YEAR 2, DOLLARS,'     00002980
     3 ,/,1X,'YEAR 3, DOLLARS')                                         00003000
  149 DO 101 I=1,6                                                      00003020
  101 IDATA(I)=1986.0                                                   00003040
      READ(5,*) ICAT,K,(IDATA(I),I=1,6)                                 00003060
      IF(ICAT.LE.0) GO TO 23                                            00003080
      CODE(ICAT,1)=K                                                    00003100
      DO 24 I=1,6,2                                                     00003120
      N=IFIX(IDATA(I))-1973                                             00003140
   24 FEDINS(ICAT,N)=IDATA(I+1)                                         00003160
      GO TO 149                                                         00003180
   23 WRITE(6,25)                                                       00003200
   25 FORMAT(1HO,'ENTER STATE INSTITUTIONAL AID',/,1X,                  00003220
     1 'INSTITUTIONAL CATEGORY, CODE (0=LUMP, 1=CAPITATION,',/,         00003240
     2 1X,'2=PER STUDENT AIDED), YEAR 1, DOLLARS, YEAR 2, DOLLARS,'     00003260
     3 ,/,1X,'YEAR 3, DOLLARS')                                         00003280
  239 DO 102 I=1,6                                                      00003300
  102 IDATA(I)=1986.0                                                   00003320
      READ(5,*) ICAT,K,(IDATA(I),I=1,6)                                 00003340
      IF(ICAT.LE.0) GO TO 26                                            00003360
      CODE(ICAT,2)=K                                                    00003380
      DO 27 I=1,6,2                                                     00003400
      N=IFIX(IDATA(I))-1973                                             00003420
   27 STAINS(ICAT,N)=IDATA(I+1)                                         00003440
      GO TO 239                                                         00003460
   26 WRITE(6,28)                                                       00003480
   28 FORMAT(1HO,'ENTER LOCAL INSTITUTIONAL AID',/,1X,                  00003500
     1 'INSTITUTIONAL CATEGORY, CODE (0=LUMP, 1=CAPITATION,',/,         00003520
     2 1X,'2=PER STUDENT AIDED), YEAR 1, DOLLARS, YEAR 2, DOLLARS,'     00003540
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     3 ,/,1X,'YEAR 3, DOLLARS')                                          00003560
269   DO 103 I=1,6                                                       00003580
103   IDATA(I)=1986.0                                                    00003600
      READ(5,*) ICAT,K,(IDATA(I), I=1,6)                                 00003620
      IF(ICAT.LE.0) GO TO 29                                             00003640
      CODE(ICAT,3)=K                                                     00003660
      DO 30 I=1,6,2                                                      00003680
      N=IFIX(IDATA(I))-1973                                              00003700
30    LOCINS(ICAT,N)=IDATA(I+1)                                          00003720
      GO TO 269                                                          00003740
29    WRITE(6,36)                                                        00003760
36    FORMAT(1HO,'ENTER FEDERAL STUDENT AID LEVELS',/,1X,                00003780
     1 'YEAR (19XX), DOLLARS OF AID, INCOME CUTOFF LEVEL, ',             00003800
     2 'INSTITUTIONAL CATEGORIES (UP TO 9 ENTRIES)')                     00003820
299   DO 407 I=1,9                                                       00003840
407   IVC(I)=0                                                           00003860
      READ(5,*) IYR, IDATA(1), IDATA(2), (IVC(I),I=1,9)                  00003880
      IF(IYR.LE.0) GO TO 17                                              00003900
      IYR=IYR-1973                                                       00003920
      N=0                                                                00003940
18    N=N+1                                                              00003960
      M=IVC(N)                                                           00003980
      IF(M.LE.0) GO TO 299                                               00004000
      FEDSA(M,IYR)=IDATA(1)                                              00004020
      FEDCUT(M,IYR)=IDATA(2)                                             00004040
      GO TO 18                                                           00004060
17    WRITE(6,19)                                                        00004080
19    FORMAT(1HO,'ENTER STATE STUDENT AID LEVELS',/,1X,                  00004100
     1 'YEAR (19XX), DOLLARS OF AID, INCOME CUTOFF LEVEL, ',             00004120
     2 'INSTITUTIONAL CATEGORIES (UP TO 9 ENTRIES)')                     00004140
179   DO 408 I=1,9                                                       00004160
 408  IVC(I)=0                                                           00004180
      READ(5,*) IYR, IDATA(1), IDATA(2), (IVC(I),I=1,9)                  00004200
      IF(IYR.LE.0) GO TO 41                                              00004220
      IYR=IYR-1973                                                       00004240
      N=0                                                                00004260
21    N=N+1                                                              00004280
      M=IVC(N)                                                           00004300
      IF(M.LE.0) GO TO 179                                               00004320
      STASA(M,IYR)=IDATA(1)                                              00004340
      STACUT(M,IYR)=IDATA(2)                                             00004360
      GO TO 21                                                           00004380
41    WRITE(6,40)                                                        00004400
40    FORMAT(1HO,'ENTER FEDERAL ASSISTANCE TO STATES',/,1X,              00004420
     1'YEAR1, FEDERAL $S, YEAR2, FEDERAL $S, YEAR3, FEDERAL $S')         00004440
      READ(5,*) (IDATA(I),I=1,6)                                         00004460
      IF(IDATA(1).LE.0.0) GO TO 31                                       00004480
      DO 32 I=1,6,2                                                      00004500
      M=IFIX(IDATA(I))-1973                                              00004520
32    FEDSTA(M)=IDATA(I+1)                                               00004540
31    WRITE(6,33)                                                        00004560
33    FORMAT(1HO,'ENTER FEDERAL ASSISTANCE TO LOCAL GOVERNMENTS',        00004580
     1/,1X,'YEAR1,FEDERAL $S, YEAR2,FEDERAL $S, YEAR3,FEDERAL $S')      00004600
      READ(5,*) (IDATA(I),I=1,6)                                         00004620
      IF(IDATA(1).LE.0.0) GO TO 34                                       00004640
      DO 35 I=1,6,2                                                      00004660
      M=IFIX(IDATA(I))-1973                                              00004680
35    FEDLOC(M)=IDATA(I+1)                                               00004700
34    WRITE(6,104)                                                       00004720
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104   FORMAT(1HO,'ENTER LIST OF TABLES TO BE PRINTED (1-11) ',          00004740
     1 'IN ORDER DESIRED')                                              00004760
      READ(5,*) (IPAG(I),I=1,20)                                        00004780
      WRITE(6,180)                                                      00004800
180   FORMAT(1HO,'THANK YOU FOR THE ENJOYABLE INPUT - PLEASE ENTER'     00004820
     1 ,/,1X,'YOUR INITIALS FOR RUN IDENTIFICATION')                    00004840
      READ(5,181) INIT                                                  00004860
181   FORMAT(A4)                                                        00004880
      IF(RCA.EQ.1) GO TO 502                                            00004900
      READ(1,50) XNAME,XESCRP,XUITNW,XEDINS,XTAINS,XOCINS,              00004920
     1 XEDSA,XEDCUT,XTASA,XTACUT,XEDSTA,XEDLOC,XEAR1,XEAR2,             00004940
     2 XEAR3,XRTCUT,XUMYR,XRIINS,XRISA,XRICUT,XVECST,                   00004960
     3 XODE,XRC,XPRC,XPAG,XERSN,XIME,XATE,XNIT                          00004980
      IF(RCB.EQ.2) GO TO 503                                            00005000
      DO 504 I=1,9                                                      00005020
      TPRC(I)=TPRC(I)+XPRC(I)                                           00005040
      DO 505 J=1,13                                                     00005060
      TUITNW(I,J)=XXTUIT(I,J)+XUITNW(I,J)                               00005080
      EDINS(I,J)=EDINS(I,J)+XEDINS(I,J)                                 00005100
      STAINS(I,J)=STAINS(I,J)+XTAINS(I,J)                               00005120
      EDSA(I,J)=EDSA(I,J)+XEDSA(I,J)                                    00005140
      EDCUT(I,J)=EDCUT(I,J)+XEDCUT(I,J)                                 00005160
      STASA(I,J)=STASA(I,J)+XTASA(I,J)                                  00005180
      STACUT(I,J)=STACUT(I,J)+XTACUT(I,J)                               00005200
      PRIINS(I,J)=PRIINS(I,J)+XRIINS(I,J)                               00005220
      PRISA(I,J)=PRISA(I,J)+XRISA(I,J)                                  00005240
      PRICUT(I,J)=PRICUT(I,J)+XRICUT(I,J)                               00005260
      AVECST(I,J)=AVECST(I,J)+XVECST(I,J)                               00005280
505   CONTINUE                                                          00005300
      DO 506 K=1,3                                                      00005320
506   CODE(I,K)=CODE(I,K)+XODE(I,K)                                     00005340
504   CONTINUE                                                          00005360
      DO 507 I=1,13                                                     00005380
      EDSTA(I)=EDSTA(I)+XEDSTA(I)                                       00005400
507   EDLOC(I)=EDLOC(I)+XEDLOC(I)                                       00005420
      DO 508 I=1,20                                                     00005440
508   IPAG(I)=IPAG(I)+XPAG(I)                                           00005460
      YEAR1=YEAR1+XEAR1                                                 00005480
      YEAR2=YEAR2+XEAR2                                                 00005500
      YEAR3=YEAR3+XEAR3                                                 00005520
      PRTCUT=PRTCUT+XRTCUT                                              00005540
      NUMYR=NUMYR+XUMYR                                                 00005560
      PRC=PRC+XRC                                                       00005580
      GO TO 502                                                         00005600
503   DO 509 I=1,9                                                      00005620
      IF(TPRC(I).EQ.0) TPRC(I)=XPRC(I)                                  00005640
      DO 510 J=1,13                                                     00005660
      TUITNW(I,J)=XUITNW(I,J)                                           00005680
      IF(XXTUIT(I,J).NE.0.0) TUITNW(I,J)=XXTUIT(I,J)                    00005700
      IF(EDINS(I,J).EQ.0.0) EDINS(I,J)=XEDINS(I,J)                      00005720
      IF(STAINS(I,J).EQ.0.0) STAINS(I,J)=XTAINS(I,J)                    00005740
      IF(EDSA(I,J).EQ.0.0) EDSA(I,J)=XEDSA(I,J)                         00005760
      IF(EDCUT(I,J).EQ.0.0) EDCUT(I,J)=XEDCUT(I,J)                      00005780
      IF(STASA(I,J).EQ.0.0) STASA(I,J)=XTASA(I,J)                       00005800
      IF(STACUT(I,J).EQ.0.0) STACUT(I,J)=XTACUT(I,J)                    00005820
      IF(PRIINS(I,J).EQ.0.0) PRIINS(I,J)=XRIINS(I,J)                    00005840
      IF(PRISA(I,J).EQ.0.0) PRISA(I,J)=XRISA(I,J)                       00005860
      IF(PRICUT(I,J).EQ.0.0) PRICUT(I,J)=XRICUT(I,J)                    00005880
      IF(AVECST(I,J).EQ.0.0) AVECST(I,J)=XVECST(I,J)                    00005900
```

(Appendix F, continued)


```
510   CONTINUE                                                          00005920
      DO 511 K=1,3                                                      00005940
511   IF(CODE(I,K).EQ.0) CODE(I,K)=XODE(I,K)                            00005960
509   CONTINUE                                                          00005980
      DO 512 I=1,13                                                     00006000
      IF(FEDSTA(I).EQ.0.0) FEDSTA(I)=XEDSTA(I)                          00006020
      IF(FEDLOC(I).EQ.0.0) FEDLOC(I)=XEDLOC(I)                          00006040
512   CONTINUE                                                          00006060
      DO 513 I=1,20                                                     00006080
      IF(IPAG(I).EQ.0) IPAG(I)=XPAG(I)                                  00006100
513   CONTINUE                                                          00006120
      IF(YEAR1.EQ.0) YEAR1=XEAR1                                        00006140
      IF(YEAR2.EQ.0) YEAR2=XEAR2                                        00006160
      IF(YEAR3.EQ.0) YEAR3=XEAR3                                        00006180
      IF(PRTCUT.EQ.0.0) PRTCUT=XRTCUT                                   00006200
      IF(NUMYR.EQ.0) NUMYR=XUMYR                                        00006220
      IF(PRC.EQ.0) PRC=XRC                                              00006240
502   REWIND 1                                                          00006260
      WRITE(1,50) RNAME,DESCRP,TUITNW,FEDINS,STAINS,LOCINS,             00006280
     1 FEDSA,FEDCUT,STASA,STACUT,FEDSTA,FEDLOC,YEAR1,YEAR2,YEAR3,       00006300
     2 PRTCUT,NUMYR,PRIINS,PRISA,PRICUT,AVECST,CODE,PRC,TPRC,           00006320
     3 IPAG,VERSN,TIME,DATE,INIT                                        00006340
50    FORMAT(10A4,/,12(18A4,/),19(5F15.0,/),2F15.0,/,3I6,               00006360
     1 F10.0,I6,/,93(5F15.0,/),3F15.0,/,28I2,/,9F8.3,/,2013,/,F4.1,5A4) 00006380
      WRITE(6,303)                                                      00006400
303   FORMAT(1X,70('-'),/,1X, 'THE INPUT STAGE OF THIS',                00006420
     1 ' ANALYSIS IS NOW COMPLETE')                                     00006440
      STOP                                                              00006460
      END                                                               00006480
```

(Appendix F, continued)


```
      IMPLICIT INTEGER(A-Z)                                                    00000020
      DIMENSION PRIINS(9,13),PRISA(9,13),PRICUT(9,13),AVECST(9,13)             00000040
      DIMENSION RNAME(10), DESCRP(18,12), TUITNW(9,13), FEDSTA(13),            00000060
     1FEDLOC(13), FEDSA(9,13), FEDCUT(9,13), STASA(9,13), STACUT(9,13),        00000080
     2FEDINS(9,13), STAINS(9,13), LOCINS(9,13), ENFORC(9,13),                  00000100
     3INDIST(9,11), TUITEX(9), NETPR(9), PRESP(9,9,11), ENDINC(11),            00000120
     4MIDINC(11), ENROLL(9,13,11), TUITN(9,13), NETPRC(9,13),                  00000140
     5TUITCH(9,13), ENAPI(9,13,11), JCV(9),KCV(9),IPAG(20)                     00000160
      DIMENSION SA(9,13,11),ENASA(9,13,11),SAP(9,13,11),PORT(9,13)             00000180
      DIMENSION TAB1(7,3),TAB2(18,6),TAB3(18,6),TAB4(11,6),                    00000200
     1TAB5(11,6),TAB6(5,3),TAB7(10,5,3),TAB8(10,5,3),                          00000220
     2TAB9(10,5,3),SAT(9,13,11),CODE(9,3),TAB10(34,3),FAID(3),SAID(3)          00000240
      DIMENSION XFEDIN(9),XSTAIN(9),XLOCIN(9),XPRIIN(9),                       00000260
     1 INDUCE(9,4,3),TNREV(9),TPRC(9),TIME(2),DATE(2),FKOD(3)                  00000280
      REAL XFEDIN,XSTAIN,XLOCIN,XPRIIN,INDUCE,FACTOR,PORT                      00000300
      REAL PRIINS,PRISA,PRICUT,AVECST,SAP,SAT,TAB10                            00000320
      REAL RNAME, DESCRP, TUITNW, FEDINS, STAINS, LOCINS, FEDSA,               00000340
     1FEDCUT, STASA, STACUT, FEDSTA, FEDLOC, INFLAT, ENFORC, INDIST,           00000360
     2TUITEX, NETPR, PRESP, ENDINC, ENROLL, TUITN, NETPRC, TUITCH,             00000380
     3ENAPI, MIDINC, ALPHA, BETA, DELTA, FSAP, SSAP, FSA, SSA, D, TERM         00000400
      REAL PRTCUT,TAB4,TAB5,SUMA,SUMB,CNT,TOTCST,TOTREV,TOTAL                  00000420
      REAL SA,ENASA,TAB1,TAB2,TABDUM,TABDMA,TAB3,TNREV,TPRC                    00000440
      REAL TAB6,TAB7,TAB8,TAB9,AIDCUT,VERSN,INIT                               00000460
      REAL FAID,SAID                                                           00000480
      AIDCUT=7500.0                                                            00000500
      WRITE(6,987)                                                             00000520
C     PROGRAM IDENTIFIER ADDED    JF 11/12/73                                  00000535
987   FORMAT(//,1X,'NCFP03 I  EXECUTION OF MDL.FORT BEGINNING')                00000540
      SUMB=500.0                                                               00000560
      READ(3,9) INFLAT                                                         00000580
9     FORMAT(F10.3)                                                            00000600
      READ(3,10)  ((ENFORC(I,J),J=1,12), I=1,9)                                00000620
10    FORMAT(6F10.0,/,6F10.0)                                                  00000640
      DO 900 I=1,9                                                             00000660
900   ENFORC(I,13)=ENFORC(I,12)*INFLAT                                         00000680
      READ(3,11) ((INDIST(I,J), J=1,11), I=1,9)                                00000700
11    FORMAT(6F10.1,/,5F10.1)                                                  00000720
      READ(3,12)(TUITEX(I),I=1,9)                                              00000740
12    FORMAT(4F8.0,5F7.0)                                                      00000760
      READ(3,12) (NETPR(I),I=1,9)                                              00000780
      READ(3,13) ((PRESP(I,J,7),J=1,9),I=1,9)                                  00000800
13    FORMAT(9F7.4)                                                            00000820
      READ(3,13) ((PRESP(I,J,9),J=1,9),I=1,9)                                  00000840
      READ(3,13) ((PRESP(I,J,11),J=1,9),I=1,9)                                 00000860
      READ(3,17) (ENDINC(I),I=1,11)                                            00000880
17    FORMAT(11F6.0)                                                           00000900
      READ(1,50)(RNAME(I1),I1=1,10),((DESCRP(I3,I2),I3=1,18),I2=1,12),         00000920
     1((TUITNW(I4,I5),I4=1,9),I5=1,13),((FEDINS(I6,I7),I6=1,9),I7=1,13),       00000940
     2((STAINS(I8,I9),I8=1,9),I9=1,13),((LOCINS(I10,I11),I10=1,9),            00000960
     3I11=1,13),((FEDSA(I12,I13),I12=1,9),I13=1,13),((FEDCUT(I14,I15),        00000980
     4I14=1,9),I15=1,13),((STASA(I16,I17),I16=1,9),I17=1,13),                 00001000
     5((STACUT(I18,I19),I18=1,9),I19=1,13),(FEDSTA(I20),I20=1,13),            00001020
     6(FEDLOC(I21),I21=1,13),YEAR1,YEAR2,YEAR3,PRTCUT,NUMYR                   00001040
     7,((PRIINS(I22,I23),I22=1,9),I23=1,13),((PRISA(I24,                      00001060
     8I25),I24=1,9),I25=1,13),((PRICUT(I26,I27),I26=1,9),                     00001080
     9I27=1,13),((AVECST(I28,I29),I28=1,9),I29=1,13)                          00001100
     1 ,((CODE(I30,I31),I30=1,9),I31=1,3),PRC,(TPRC(I32),I32=1,9)             00001120
     2 ,(IPAG(I33),I33=1,20),VERSN,TIME,DATE,INIT                             00001140
50    FORMAT(10A4,/,12(18A4,/),192(5F15.0,/),2F15.0,/,3I6,F10.0,               00001160
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     1 I6,/,93(5F15.0,/),3F15.0,/,2812,/,9F8.3,/,2013,/,F4.1,5A4)          00001180
       DO 40 I=1,9                                                         00001200
       DO 40 J=1,9                                                         00001220
       DO 136 N1=1,7                                                       00001240
136    PRESP(I,J,N1)=-PRESP(I,J,7)/1000.0                                  00001260
       DO 137 N2=8,9                                                       00001280
137    PRESP(I,J,N2)=-PRESP(I,J,9)/1000.0                                  00001300
       DO 138 N3=10,11                                                     00001320
138    PRESP(I,J,N3)=-PRESP(I,J,11)/1000.0                                 00001340
40     CONTINUE                                                            00001360
       DO 14 I=1,9                                                         00001380
       TNREV(I)=0.0                                                        00001400
       DO 14 J=1,13                                                        00001420
       DO 14 K=1,11                                                        00001440
       SA(I,J,K)=0.0                                                       00001460
       SAP(I,J,K)=0.0                                                      00001480
       SAT(I,J,K)=0.0                                                      00001500
       ENASA(I,J,K)=0.0                                                    00001520
       ENAPI(I,J,K)=0.0                                                    00001540
       ENROLL(I,J,K)=ENFORC(I,J)*INDIST(I,K)/100.0                         00001560
14     CONTINUE                                                            00001580
C      WRITE(6,109) (PRESP(3,I),I=1,11)                                    00001600
C109   FORMAT(1X,6E10.0,/,1X,6E10.0)                                       00001620
C      WRITE(6,100) (ENROLL(3,1,I), I=1,11)                                00001640
 100   FORMAT(1X, 6F10.0,/,10X,5F10.0)                                     00001660
       DO 15 I=1,9                                                         00001680
       DO 15 J=1,13                                                        00001700
       TUITN(I,J)=TUITEX(I)*(INFLAT**(J+1))                                00001720
       NETPRC(I,J)=NETPR(I)*(INFLAT**(J+1))                                00001740
       TUITCH(I,J)=TUITNW(I,J)-TUITN(I,J)                                  00001760
       IF(TUITCH(I,J).LT.1.0.AND.TUITCH(I,J).GT.-1.0) TUITCH(I,J)=0.0      00001780
15     CONTINUE                                                            00001800
       DO 18 I=2,10                                                        00001820
       MIDINC(I)=((ENDINC(I)-ENDINC(I-1))/2.0)+ENDINC(I-1)                 00001840
18     MIDINC(I)=MIDINC(I)+SUMB                                            00001860
       DO 60 I=1,7                                                         00001880
       DO 60 J=1,3                                                         00001900
 60    TAB1(I,J)=0.0                                                       00001920
       DO 63 I=1,18                                                        00001940
       DO 63 J=1,6                                                         00001960
       TAB3(I,J)=0.0                                                       00001980
 63    TAB2(I,J)=0.0                                                       00002000
       DO 67 I=1,11                                                        00002020
       DO 67 J=1,6                                                         00002040
       TAB5(I,J)=0.0                                                       00002060
 67    TAB4(I,J)=0.0                                                       00002080
       DO 90 I=1,5                                                         00002100
       DO 90 J=1,3                                                         00002120
       TAB6(I,J)=0.0                                                       00002140
       DO 90 K=1,10                                                        00002160
       TAB7(K,I,J)=0.0                                                     00002180
       TAB8(K,I,J)=0.0                                                     00002200
       TAB9(K,I,J)=0.0                                                     00002220
90     CONTINUE                                                            00002240
       DO 501 I=1,3                                                        00002260
       FKOD(I)=0.0                                                         00002280
       DO 501 J=1,34                                                       00002300
501    TAB10(J,I)=0.0                                                      00002320
       MIDINC(1)=MIDINC(2)                                                 00002340
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      MIDINC(11)=ENDINC(10)*2.0                                          00002360
      MIDINC(1)=MIDINC(1)+SUMB                                           00002380
      MIDINC(11)=MIDINC(11)+SUMB                                         00002400
      IYEAR=0                                                            00002420
      FACTOR=0.0                                                         00002440
C     INITIALIZING FAID AND SAID FOR CASE WHERE ONLY 1 OR 2 YEARS RUN    00002442
C     PROCESSED, CHANGE MADE 11/13/72 JF                                 00002444
C                                                                        00002446
      DO 6904 I = 1,3                                                    00002448
      FAID(I) = 0.0                                                      00002450
      SAID(I) = 0.0                                                      00002452
6904    CONTINUE                                                         00002454
      DO 20 IYR=1,13                                                     00002460
      IF(IYR.EQ.YEAR1) GO TO 41                                          00002480
      IF(IYR.EQ.YEAR2) GO TO 41                                          00002500
      IF(IYR.EQ.YEAR3) GO TO 41                                          00002520
      GO TO 20                                                           00002540
41    IC=0                                                               00002560
      IYEAR=IYEAR+1                                                      00002580
      FAID(IYEAR)=0.0                                                    00002600
      SAID(IYEAR)=0.0                                                    00002620
      IT=11                                                              00002640
      N=0                                                                00002660
22    N=N+1                                                              00002680
      IF(FEDCUT(N,IYR).GT.0.0.OR.STACUT(N,IYR).GT.0.0)                   00002700
     1GO TO 21                                                           00002720
      IF(N.GE.9) GO TO 23                                                00002740
      GO TO 22                                                           00002760
21    DO 19 I=1,11                                                       00002780
      IF(FEDCUT(N,IYR).GE.ENDINC(I).OR.STACUT(N,IYR).                    00002800
     1GE.ENDINC(I))  IC=IC+1                                             00002820
19    CONTINUE                                                           00002840
      IF(FEDCUT(N,IYR).EQ.ENDINC(IC).OR.STACUT(N,IYR).                   00002860
     1 EQ.ENDINC(IC)) GO TO 23                                           00002880
      IF(FEDCUT(N,IYR).EQ.0.0) SUMA=STACUT(N,IYR)                        00002900
      IF(STACUT(N,IYR).EQ.0.0) SUMA=FEDCUT(N,IYR)                        00002920
      FACTOR=(SUMA-ENDINC(IC))/(ENDINC(IC+1)-ENDINC(IC))                 00002940
      DO 140 I=1,9                                                       00002960
      IC1=IC+1                                                           00002980
      DO 140 K=1,11                                                      00003000
      ENROLL(I,IYR,K)=ENFORC(I,IYR)*INDIST(I,K)/100.0                    00003020
      IF(K.EQ.IC) ENROLL(I,IYR,K)=ENFORC(I,IYR)/100.0                    00003040
     1 *(INDIST(I,IC)+(FACTOR*INDIST(I,IC1)))                            00003060
      IF(K.EQ.IC1) ENROLL(I,IYR,K)=ENFORC(I,IYR)/100.0                   00003080
     1 *((1.0-FACTOR)*INDIST(I,IC1))                                     00003100
140   CONTINUE                                                           00003120
23    DO 25 I=1,9                                                        00003140
      KCV(I)=0                                                           00003160
25    JCV(I)=0                                                           00003180
      DO 16 I=1,9                                                        00003200
      DO 16 K=1,11                                                       00003220
      SUMA=0.0                                                           00003240
      DO 131 N=1,9                                                       00003260
131   SUMA=SUMA+(PRESP(I,N,K)*TUITCH(N,IYR))                             00003280
      ENAPI(I,IYR,K)=(1.0-SUMA)*ENROLL(I,IYR,K)                          00003300
      ENASA(I,IYR,K)=ENAPI(I,IYR,K)                                      00003320
16    CONTINUE                                                           00003340
      FIC=IC                                                             00003360
      SIC=IC                                                             00003380
```

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      IF(IC.GT.0) AIOCUT=ENDINC(IC)                                     00003400
      DO 26 I=1,9                                                       00003420
      IF(FEDCUT(I,IYR).GT.0.0) JCV(I)=1                                 00003440
      IF(FEDCUT(I,IYR).GT.0.0) FAID(IYEAR)=FEDCUT(I,IYR)                00003460
      IF(STACUT(I,IYR).GT.0.0) KCV(I)=1                                 00003480
      IF(STACUT(I,IYR).GT.0.0) SAID(IYEAR)=STACUT(I,IYR)                00003500
26    CONTINUE                                                          00003520
      IF(PRC.EQ.1) WRITE(6,106) IC,JCV,MIDINC,ENDINC                    00003540
 106  FORMAT(1X,1016,/,1X,11F6.0,/,1X,11F6.0)                           00003560
      DO 104 J=1,9                                                      00003580
      IF(TUITCH(J,IYR).LE.0.0) GO TO 104                                00003600
      ALPHA=0.0                                                         00003620
      BETA=0.0                                                          00003640
      DELTA=0.0                                                         00003660
      DO 27 I=1,IC                                                      00003680
      SUMA=0.0                                                          00003700
      DO 132 N=1,9                                                      00003720
132   SUMA=SUMA+(PRESP(J,N,I)*TUITNW(N,IYR))                            00003740
      ALPHA=ALPHA+(ENAPI(J,IYR,I)*SUMA*TUITNW(J,IYR)                    00003760
     1 /(MIDINC(I)**2))                                                 00003780
      BETA=BETA+(((ENAPI(J,IYR,I)*TUITNW(J,IYR))-(TUITCH(               00003800
     1 J,IYR)*ENAPI(J,IYR,I)*SUMA))/MIDINC(I))                          00003820
      DELTA=DELTA+(TUITCH(J,IYR)*ENAPI(J,IYR,I))                        00003840
27    CONTINUE                                                          00003860
      IF(PRC.EQ.1) WRITE(6,901) (TUITCH(I,IYR),I=1,9)                   00003880
 901  FORMAT(1X,'TUITCH',/,1X,9F7.0)                                    00003900
C     WRITE(6,902) DELTA                                                00003920
C902  FORMAT(1X,'DELTA',5X,E12.3)                                       00003940
      IC1=IC+1                                                          00003960
      DO 28 I=IC1,IT                                                    00003980
      DELTA=DELTA+(TUITCH(J,IYR)*ENAPI(J,IYR,I))                        00004000
28    CONTINUE                                                          00004020
      TNREV(J)=DELTA                                                    00004040
      NF=0                                                              00004060
      NS=0                                                              00004080
      DELTA=-DELTA*TPRC(J)                                              00004100
      TERM=(BETA**2)-(4.0*ALPHA * DELTA)                                00004120
      D=0.0                                                             00004140
      IF(ALPHA.EQ.0.0) GO TO 105                                        00004160
      D=(-BETA+SQRT(TERM))/(2.0*ALPHA)                                  00004180
C 105 WRITE(6,101) ALPHA, BETA, DELTA, D                                00004200
C101  FORMAT(5X,4E10.3)                                                 00004220
105   DO 49 I=1,IC                                                     00004240
      SA(J,IYR,I)=D*TUITNW(J,IYR)/MIDINC(I)                             00004260
49    CONTINUE                                                          00004280
C     WRITE(6,100) (SA(J,IYR,I),I=1,11)                                 00004300
104   CONTINUE                                                          00004320
      TABDUM=0.0                                                        00004340
      DO 51 I=1,9                                                       00004360
      DO 51 J=1,IC                                                      00004380
      SUMA=0.0                                                          00004400
      DO 133 N=1,9                                                      00004420
133   SUMA=SUMA+(PRESP(I,N,J)*SA(N,IYR,J))                              00004440
      ENASA(I,IYR,J)=ENAPI(I,IYR,J)*(1.0+SUMA)                          00004460
 51   CONTINUE                                                          00004480
      IF(PRC.EQ.1) WRITE(6,100) (ENROLL(I,IYR,1),I=1,9)                 00004500
      IF(PRC.EQ.1) WRITE(6,100) (ENAPI(I,IYR,1),I=1,9)                  00004520
      DO 103 I=1,9                                                      00004540
      DO 103 J=1,7                                                      00004560
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103   TABDUM=TABDUM+(SA(I,IYR,J)*ENASA(I,IYR,J))                        00004580
C     WRITE(6,102) TABDUM                                               00004600
C102  FORMAT(1X,'TOTAL STUDENT AID',/,1X,5F12.0)                        00004620
      IF(PRC.EQ.1) WRITE(6,100) (ENASA(I,IYR,1),I=1,9)                  00004640
      ALPHA=0.0                                                         00004660
      BETA=0.0                                                          00004680
      DELTA = 0.0                                                       00004700
      FSAP=0.0                                                          00004720
      SSAP=0.0                                                          00004740
      DO 32 N=1,9                                                       00004760
      IF(FEDCUT(N,IYR).GT.0.0) NF=NF+1                                  00004780
      IF(FEDCUT(N,IYR).GT.0.0) FSAP=FEDSA(N,IYR)                        00004800
      IF(STACUT(N,IYR).GT.0.0) NS=NS+1                                  00004820
      IF(STACUT(N,IYR).GT.0.0) SSAP=STASA(N,IYR)                        00004840
32    CONTINUE                                                          00004860
      FSA=0.0                                                           00004880
      SSA=0.0                                                           00004900
      IF(NF.EQ.9) FSA=FEDSA(1,IYR)                                      00004920
      IF(NS.EQ.9) SSA=STASA(1,IYR)                                      00004940
      IF(NF.EQ.9) FSAP=0.0                                              00004960
      IF(NS.EQ.9) SSAP=0.0                                              00004980
      SUMA=FSA+FSAP                                                     00005000
      SUMB=SSA+SSAP                                                     00005020
      DO 400 MM=1,2                                                     00005040
      DO 310 I=1,9                                                      00005042
      DO 310 J=1,13                                                     00005044
      DO 310 K=1,11                                                     00005046
310   SAP(I,J,K)=0.0                                                    00005048
      MS=1                                                              00005060
      IF(MM.EQ.1.AND.SUMA.LT.0.0) MS=2                                  00005080
      IF(MM.EQ.2.AND.SUMB.LT.0.0) MS=2                                  00005100
      ALPHA=0.0                                                         00005120
      BETA=0.0                                                          00005140
      IF(IC.EQ.0) GO TO 80                                              00005160
      DO 81 I=1,IC                                                      00005180
      DO 81 J=1,9                                                       00005200
      IF(MM.EQ.1.AND.JCV(J).EQ.0) GO TO 81                              00005220
      IF(MM.EQ.2.AND.KCV(J).EQ.0) GO TO 81                              00005240
      TABDUM=TUITNW(J,IYR)                                              00005260
      IF(TUITNW(J,IYR).EQ.0.0) TUITNW(J,IYR)=TUITN(J,IYR)               00005280
      SUMA=0.0                                                          00005300
      DO 134 N=1,9                                                      00005320
134   SUMA=SUMA+(PRESP(J,N,I)*TUITNW(N,IYR))                            00005340
      ALPHA=ALPHA+(ENAPI(J,IYR,I)*SUMA*                                 00005360
     1 TUITNW(J,IYR)/(MIDINC(I)**2))                                    00005380
      BETA=BETA+(ENASA(J,IYR,I)*TUITNW(J,IYR)/MIDINC(I))                00005400
      IF(TABDUM.EQ.0.0) TUITNW(J,IYR)=0.0                               00005420
81    CONTINUE                                                          00005440
80    DELTA=-FSAP-FSA                                                   00005460
      IF(MM.EQ.2) DELTA=-SSAP-SSA                                       00005480
      IF(MS.EQ.2) DELTA=-DELTA                                          00005500
      TERM=(BETA**2)-(4.0*ALPHA*DELTA)                                  00005520
      D=0.0                                                             00005540
      IF(ALPHA.EQ.0.0) GO TO 85                                         00005560
      D=(-BETA+SQRT(TERM))/(2.0*ALPHA)                                  00005580
      IF(MS.EQ.2) D=-D                                                  00005600
C85   WRITE(6,101) ALPHA,BETA,DELTA,D                                   00005620
85    DO 82 I=1,9                                                       00005640
      DO 82 J=1,IC                                                      00005660
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      IF(MM.EQ.1.AND.JCV(I).EQ.0) GO TO 82                              00005680
      IF(MM.EQ.2.AND.KCV(I).EQ.0) GO TO 82                              00005700
      TABDUM=TUITNW(I,IYR)                                              00005720
      IF(TUITNW(I,IYR).EQ.0.0) TUITNW(I,IYR)=TUITN(I,IYR)               00005740
      SAP(I,IYR,J)=D*TUITNW(I,IYR)/MIDINC(J)                            00005760
      IF(TABDUM.EQ.0.0) TUITNW(I,IYR)=0.0                               00005780
82    CONTINUE                                                          00005800
      IF(PRC.EQ.1) WRITE(6,998) MM,MS,JCV,KCV,ALPHA,BETA,DELTA,D        00005820
998   FORMAT(1X,'TEST', 2I5,/,1X,18I3,/,1X,4F15.3)                      00005840
C     WRITE(6,100) (SAP(3,IYR,I),I=1,11)                                00005860
      DO 83 I=1,9                                                       00005880
      DO 83 J=1,IC                                                      00005900
      SUMA=0.0                                                          00005960
      DO 135 N=1,9                                                      00005980
135   SUMA=SUMA+(PRESP(I,N,J)*SAP(N,IYR,J))                             00006000
      ENASA(I,IYR,J)=ENASA(I,IYR,J)*(1.0+SUMA)                          00006020
83    CONTINUE                                                          00006040
      IF(PRC.EQ.1) WRITE(6,100) (ENASA(I,IYR,1),I=1,9)                  00006060
      TABDUM=0.0                                                        00006080
      DO 84 I=1,9                                                       00006100
      DO 84 J=1,IC                                                      00006120
      SAT(I,IYR,J)=SAT(I,IYR,J)+SAP(I,IYR,J)                            00006140
84    TABDUM=TABDUM+(SAP(I,IYR,J)*ENASA(I,IYR,J))                       00006160
C     WRITE(6,102) TABDUM,FSA,FSAP,SSA,SSAP                             00006180
400   CONTINUE                                                          00006200
      DO 401 I=1,9                                                      00006220
      SUMA=(FACTOR*INDIST(I,IC+1))/(INDIST( I,IC)+(FACTOR*              00006240
     1 INDIST(I,IC+1)))                                                 00006260
      DO 401 J=1,13                                                     00006280
      SUMB=ENASA(I,J,IC)                                                00006300
      ENASA(I,J,IC)=(1.0-SUMA)*SUMB                                     00006320
      ENASA(I,J,IC+1)=ENASA(I,J,IC+1)+(SUMA*SUMB)                       00006340
      PORT(I,J)=SUMA*SUMB                                               00006360
      SUMB=ENROLL(I,J,IC)                                               00006380
      ENROLL(I,J,IC)=(1.0-SUMA)*SUMB                                    00006400
      ENROLL(I,J,IC+1)=ENROLL(I,J,IC+1)+(SUMA*SUMB)                     00006420
      DO 401 K=1,11                                                     00006440
401   SAT(I,J,K)=SAT(I,J,K)+SA(I,J,K)                                   00006460
      TAB1(1,IYEAR)=FSA+FSAP                                            00006480
      TAB1(2,IYEAR)=SSA+SSAP                                            00006500
      SUMA=0.0                                                          00006520
      SUMB=0.0                                                          00006540
      NF=2                                                              00006560
      NS=2                                                              00006580
      DO 61 I=1,9                                                       00006600
      IF(CODE(I,1).EQ.2) NF=3                                           00006620
      IF(CODE(I,2).EQ.2) NS=3                                           00006640
      TAB1(3,IYEAR)=TAB1(3,IYEAR)+FEDINS(I,IYR)                         00006660
      TAB1(4,IYEAR)=TAB1(4,IYEAR)+STAINS(I,IYR)                         00006680
      IF(CODE(I,1).EQ.0) GO TO 500                                      00006700
      IF(FEDINS(I,IYR).GT.0.0) SUMA=SUMA+1.0                            00006720
500   IF(CODE(I,2).EQ.0) GO TO 61                                       00006740
      IF(STAINS(I IYR).GT.0.0) SUMB=SUMB+1.0                            00006760
 61   CONTINUE                                                          00006780
      IF(SUMA.GT.0.0) TAB1(3,IYEAR)=TAB1(3,IYEAR)/SUMA                  00006800
      IF(SUMB.GT.0.0) TAB1(4,IYEAR)=TAB1(4,IYEAR)/SUMB                  00006820
      IF(TAB1(3,1).EQ.0.0) GO TO 504                                    00006840
      FKOD(1)=1                                                         00006860
      IF(SUMA.GT.0.0) FKOD(1)=NF                                        00006880
```

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504   IF(TAB1(4,1).EQ.0.0) GO TO 505                                    00006900
      FKOD(2)=1                                                         00006920
      IF(SUMB.GT.0.0) FKOD(2)=NS                                        00006940
505   CONTINUE                                                          00006960
      SUMA=0.0                                                          00006980
      SUMB=0.0                                                          00007000
      DO 350 I=1,4                                                      00007020
      DO 350 J=1,11                                                     00007040
      SUMA=SUMA+ENASA(I,IYR,J)                                          00007060
      SUMB=SUMB+(TUITNW(I,IYR)*ENASA(I,IYR,J))                          00007080
350   CONTINUE                                                          00007100
      TAB1(5,IYEAR)=SUMB/SUMA                                           00007120
      TAB1(6,IYEAR)=FEDSTA(IYR)                                         00007140
      TAB1(7,IYEAR)=FEDLOC(IYR)                                         00007160
C     WRITE(6,62) (TAB1(I,IYEAR),I=1,7)                                 00007180
C62   FORMAT(2X,'TAB1',/,7(1X,F10.0,/))                                 00007200
      DO 64 I=1,9                                                       00007220
      TABDUM=0.0                                                        00007240
      TABDMA=0.0                                                        00007260
      DO 65 J=1,11                                                      00007280
      TAB2(I,IYEAR+3)=TAB2(I,IYEAR+3)+ENASA(I,IYR,J)                    00007300
      TAB2(I,IYEAR)=TAB2(I,IYEAR)+ENROLL(I,IYR,J)                       00007320
      IF(ENDINC(J).GT.PRTCUT) GO TO 65                                  00007340
      TABDUM=TABDUM+ENASA(I,IYR,J)                                      00007360
      TABDMA=TABDMA+ENROLL(I,IYR,J)                                     00007380
 65   CONTINUE                                                          00007400
      TAB2(I+9,IYEAR+3)=(TABDUM/TAB2(I,IYEAR+3))*100.0                  00007420
      TAB2(I+9,IYEAR)=(TABDMA/TAB2(I,IYEAR))*100.0                      00007440
 64   CONTINUE                                                          00007460
C     WRITE(6,66) (TAB2(I,IYEAR),TAB2(I,IYEAR+3),I=1,18)                00007480
C66   FORMAT(2X,'TAB2',/,18(1X,2F10.0,/))                               00007500
      DO 68 I=1,9                                                       00007520
      TABDMA=0.0                                                        00007540
      TABDUM=0.0                                                        00007560
      TAB3(I,IYEAR)=TUITN(I,IYR)                                        00007580
      TAB3(I,IYEAR+3)=TUITNW(I,IYR)                                     00007600
      TAB3(I+9,IYEAR)=NETPRC(I,IYR)                                     00007620
      IC1=IC+1                                                          00007640
      DO 69 J=1,11                                                      00007660
      TABDMA=TABDMA+ENASA(I,IYR,J)                                      00007680
      IF(J.EQ.IC1) GO TO 141                                            00007700
      TABDUM=TABDUM+((TUITCH(I,IYR)+NETPRC(I,IYR)-SAT(I,IYR,J))*        00007720
     1ENASA(I,IYR,J))                                                   00007740
      GO TO 69                                                          00007760
141   TABDUM=TABDUM+((TUITCH(I,IYR)+NETPRC(I,IYR)                       00007780
     1 -SAT(I,IYR,J))*(ENASA(I,IYR,J)-PORT(I,IYR)))                     00007800
      TABDUM=TABDUM+((TUITCH(I,IYR)+NETPRC(I,IYR)-SAT                   00007820
     1 (I,IYR,IC))*PORT(I,IYR))                                         00007840
 69   CONTINUE                                                          00007860
      TAB3(I+9,IYEAR+3)=TABDUM/TABDMA                                   00007880
 68   CONTINUE                                                          00007900
C     WRITE(6,70) (TAB3(I,IYEAR),TAB3(I,IYEAR+3),I=1,18)                00007920
C70   FORMAT(2X,'TAB3',/,18(2F10.0,/))                                  00007940
      DO 74 I=1,11                                                      00007960
      TAB4(I,IYEAR)=ENROLL(9,IYR,I)                                     00007980
      TAB4(I,IYEAR+3)=ENASA(9,IYR,I)                                    00008000
      DO 74 J=1,3                                                       00008020
      TAB4(I,IYEAR)=TAB4(I,IYEAR)+ENROLL(J,IYR,I)+                      00008040
     1 ENROLL(J+4,IYR,I)                                                00008060
```

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      TAB4(I,IYEAR+3)=TAB4(I,IYEAR+3)+ENASA(J,IYR,I)+                    00008080
     1 ENASA(J+4,IYR,I)                                                  00008100
74    CONTINUE                                                           00008120
C     WRITE(6,75) (TAB4(I,IYEAR),TAB4(I,IYEAR+3),I=1,11)                00008140
C75   FORMAT(2X,'TAB4',/,11(1X,2F10.0,/))                               00008160
      DO 78 I=1,11                                                       00008180
      SUMA=0.0                                                           00008200
      SUMB=0.0                                                           00008220
      CNT=0.0                                                            00008240
      IC1=IC+1                                                           00008260
      DO 79 J=1,9                                                        00008280
      SUMB=SUMB+(TUITCH(J,IYR)*ENASA(J,IYR,I))                           00008300
      CNT=CNT+ENASA(J,IYR,I)                                             00008320
      IF(I.EQ.IC1) GO TO 142                                             00008340
      SUMA=SUMA+(SAT(J,IYR,I)*ENASA(J,IYR,I))                            00008360
      GO TO 79                                                           00008380
142   SUMA=SUMA+(SAT(J,IYR,I)*(ENASA(J,IYR,I)                            00008400
     1 -PORT(J,IYR)))                                                    00008420
      SUMA=SUMA+(SAT(J,IYR,IC)*PORT(J,IYR))                              00008440
79    CONTINUE                                                           00008460
      TAB5(I,IYEAR)=SUMA/CNT                                             00008480
      TAB5(I,IYEAR+3)=SUMB/CNT                                           00008500
78    CONTINUE                                                           00008520
C     WRITE(6,73) (TAB5(I,IYEAR),TAB5(I,IYEAR+3),I=1,11)                00008540
C73   FORMAT(2X,'TAB5',/,11(1X,2F10.0,/))                               00008560
      REWIND 2                                                           00008580
      READ(2,305) (XFEDIN(I),I=1,9),(XSTAIN(IA),IA=1,9),                00008600
     1 (XLOCIN(IB),IB=1,9),(XPRIIN(IC),IC=1,9)                           00008620
305   FORMAT(1X,/,4(5F12.0,/,4F12.0,/))                                  00008640
      DO 92 I=1,9                                                        00008660
      SUMA=0.0                                                           00008680
      DO 94 J=1,11                                                       00008700
94    SUMA=SUMA+ENASA(I,IYR,J)                                           00008720
      IF(CODE(I,1).EQ.0) GO TO 93                                        00008740
      SUMB=0.0                                                           00008760
      DO 95 J=1,FIC                                                      00008780
95    SUMB=SUMB+ENASA(I,IYR,J)                                           00008800
      SUMB=SUMB+(FACTOR*ENASA(I,IYR,FIC+1))                              00008820
      IF(CODE(I,1).EQ.1) FEDINS(I,IYR)=SUMA*FEDINS(I,IYR)                00008840
      IF(CODE(I,1).EQ.2) FEDINS(I,IYR)=SUMB*FEDINS(I,IYR)                00008860
93    IF(CODE(I,2).EQ.0) GO TO 96                                        00008880
      SUMB=0.0                                                           00008900
      DO 97 J=1,SIC                                                      00008920
97    SUMB=SUMB+ENASA(I,IYR,J)                                           00008940
      SUMB=SUMB+(FACTOR*ENASA(I,IYR,SIC+1))                              00008960
      IF(CODE(I,2).EQ.1) STAINS(I,IYR)=SUMA*STAINS(I,IYR)                00008980
      IF(CODE(I,2).EQ.2) STAINS(I,IYR)=SUMB*STAINS(I,IYR)                00009000
96    IF(CODE(I,3).EQ.0) GO TO 92                                        00009020
      SUMB=0.0                                                           00009040
      DO 98 J=1,SIC                                                      00009060
98    SUMB=SUMB+ENASA(I,IYR,J)                                           00009080
      SUMB=SUMB+(FACTOR*ENASA(I,IYR,SIC+1))                              00009100
      IF(CODE(I,3).EQ.1) LOCINS(I,IYR)=SUMA*LOCINS(I,IYR)                00009120
      IF(CODE(I,3).EQ.2) LOCINS(I,IYR)=SUMB*LOCINS(I,IYR)                00009140
92    CONTINUE                                                           00009160
      DO 125 I=1,9                                                       00009180
      TOTCST=0.0                                                         00009200
      TOTREV=TNREV(I)*(1.0-TPRC(I))                                      00009220
      DO 126 J=1,11                                                      00009240
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                                        MDL
      TOTCST=TOTCST+(AVECST(I,IYR)*(ENASA(I,IYR,J)                          00009260
     1 -ENROLL(I,IYR,J)))                                                   00009280
      TOTREV=TOTREV+(TUITNW(I,IYR)*(ENASA(I,IYR,J)                          00009300
     1 -ENROLL(I,IYR,J)))                                                   00009320
126   CONTINUE                                                              00009340
      TOTAL=XFEDIN(I)+XSTAIN(I)+XLOCIN(I)+XPRIIN(I)                         00009360
      INDUCE(I,1,IYEAR)=(TOTCST-TOTREV)*(XFEDIN(I)/TOTAL)                   00009380
      INDUCE(I,2,IYEAR)=(TOTCST-TOTREV)*(XSTAIN(I)/TOTAL)                   00009400
      INDUCE(I,3,IYEAR)=(TOTCST-TOTREV)*(XLOCIN(I)/TOTAL)                   00009420
      INDUCE(I,4,IYEAR)=(TOTCST-TOTREV)*(XPRIIN(I)/TOTAL)                   00009440
125   CONTINUE                                                              00009460
C     WRITE(6,127) ((INDUCE(I,J,IYEAR),J=1,4),I=1,9)                        00009480
C127  FORMAT(2X,'INDUCED FINANCIAL EFFECTS',/,9(1X,                         00009500
C     1 4F12.0,/))                                                          00009520
      SUMA=FEDSA(1,IYR)+FEDSA(2,IYR)+FEDSA(3,IYR)+FEDSA(5,IYR)+             00009540
     1 FEDSA(6,IYR)+FEDSA(7,IYR)+FEDSA(9,IYR)                               00009560
      SUMB=FEDSA(4,IYR)+FEDSA(8,IYR)                                        00009580
      IF(SUMA.LT.0.0) SUMA=-SUMA                                            00009600
      IF(SUMB.LT.0.0) SUMB=-SUMB                                            00009620
      IF(SUMA.GT.0.0.AND.SUMB.EQ.0.0) M=1                                   00009640
      IF(SUMA.EQ.0.0.AND.SUMB.GT.0.0) M=3                                   00009660
      IF(SUMA.GT.0.0.AND.SUMB.GT.0.0) M=4                                   00009680
      IF(SUMA.EQ.0.0.AND.SUMB.EQ.0.0) GO TO 110                             00009700
      DO 112 I=1,9                                                          00009720
      IF(FEDSA(I,IYR).EQ.0.0) GO TO 112                                     00009740
      IF(FEDCUT(I,IYR).GT.7500.0.AND.M.EQ.1) M=2                            00009760
      CNT=FEDSA(I,IYR)                                                      00009780
112   CONTINUE                                                              00009800
      TAB7(M,1,IYEAR)=CNT                                                   00009820
110   SUMA=STASA(1,IYR)+STASA(2,IYR)+STASA(3,IYR)+STASA(5,IYR)+             00009840
     1 STASA(6,IYR)+STASA(7,IYR)+STASA(9,IYR)                               00009860
      SUMB=STASA(4,IYR)+STASA(8,IYR)                                        00009880
      IF(SUMA.LT.0.0) SUMA=-SUMA                                            00009900
      IF(SUMB.LT.0.0) SUMB=-SUMB                                            00009920
      IF(SUMA.GT.0.0.AND.SUMB.EQ.0.0) M=1                                   00009940
      IF(SUMA.EQ.0.0.AND.SUMB.GT.0.0) M=3                                   00009960
      IF(SUMA.GT.0.0.AND.SUMB.GT.0.0) M=4                                   00009980
      IF(SUMA.EQ.0.0.AND.SUMB.EQ.0.0) GO TO 113                             00010000
      DO 114 I=1,9                                                          00010020
      IF(STASA(I,IYR).EQ.0.0) GO TO 114                                     00010040
      IF(STACUT(I,IYR).GT.7500.0.AND.M.EQ.1) M=2                            00010060
      CNT=STASA(I,IYR)                                                      00010080
114   CONTINUE                                                              00010100
      TAB7(M,2,IYEAR)=CNT                                                   00010120
113   TAB7(5,1,IYEAR)=FEDINS(1,IYR)                                         00010140
      TAB7(6,1,IYEAR)=FEDINS(2,IYR)+FEDINS(3,IYR)+FEDINS(4,IYR)             00010160
      TAB7(7,1,IYEAR)=FEDINS(5,IYR)+FEDINS(6,IYR)+FEDINS(7,IYR)+            00010180
     1 FEDINS(8,IYR)                                                        00010200
      TAB7(8,1,IYEAR)=FEDINS(9,IYR)                                         00010220
      TAB7(5,2,IYEAR)=STAINS(1,IYR)                                         00010240
      TAB7(6,2,IYEAR)=STAINS(2,IYR)+STAINS(3,IYR)+STAINS(4,IYR)             00010260
      TAB7(7,2,IYEAR)=STAINS(5,IYR)+STAINS(6,IYR)+STAINS(7,IYR)+            00010280
     1 STAINS(8,IYR)                                                        00010300
      TAB7(8,2,IYEAR)=STAINS(9,IYR)                                         00010320
      TAB7(5,3,IYEAR)=LOCINS(1,IYR)                                         00010340
      TAB7(6,3,IYEAR)=LOCINS(2,IYR)+LOCINS(3,IYR)+LOCINS(4,IYR)             00010360
      TAB7(7,3,IYEAR)=LOCINS(5,IYR)+LOCINS(6,IYR)+LOCINS(7,IYR)+            00010380
     1 LOCINS(8,IYR)                                                        00010400
      TAB7(8,3,IYEAR)=LOCINS(9,IYR)                                         00010420
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      TAB7(9,1,IYEAR)=FEDSTA(IYR)                                          00010440
      TAB7(9,2,IYEAR)=-FEDSTA(IYR)                                         00010460
      TAB7(10,1,IYEAR)=FEDLOC(IYR)                                         00010480
      TAB7(10,2,IYEAR)=-FEDLOC(IYR)                                        00010500
      IF(PRC.EQ.1) WRITE(6,122) ((TAB7(I,J,IYEAR),J=1,5),I=1,10)           00010520
  122 FORMAT(1X,'TAB7',/,10(1X,5F14.0,/))                                  00010540
      DO 115 I=1,9                                                         00010560
      IF(I.EQ.4.OR.I.EQ.8) GO TO 115                                       00010580
      DO 117 J=IC,11                                                       00010600
      TAB8(2,4,IYEAR)=TAB8(2,4,IYEAR)+(TUITCH(I,IYR)*                      00010620
     1 ENASA(I,IYR,J))                                                     00010640
  117 CONTINUE                                                             00010660
  115 CONTINUE                                                             00010680
      TAB8(1,4,IYEAR)=-TAB8(2,4,IYEAR)                                     00010700
      DO 217 I=1,3                                                         00010720
  217 TAB8(4,4,IYEAR)=TAB8(4,4,IYEAR)+TAB8(I,4,IYEAR)                      00010740
      DO 118 I=1,4                                                         00010760
      M=I                                                                  00010780
      IF(I.EQ.4) M=5                                                       00010800
      TAB8(5,M,IYEAR)=INDUCE(1,I,IYEAR)                                    00010820
      TAB8(6,M,IYEAR)=INDUCE(2,I,IYEAR)+INDUCE(3,I,IYEAR)+                 00010840
     1 INDUCE(4,I,IYEAR)                                                   00010860
      TAB8(7,M,IYEAR)=INDUCE(5,I,IYEAR)+INDUCE(6,I,IYEAR)+                 00010880
     1 INDUCE(7,I,IYEAR)+INDUCE(8,I,IYEAR)                                 00010900
      TAB8(8,M,IYEAR)=INDUCE(9,I,IYEAR)                                    00010920
  118 CONTINUE                                                             00010940
      DO 119 I=1,11                                                        00010960
      TAB8(5,4,IYEAR)=TAB8(5,4,IYEAR)+((ENASA(1,IYR,I)                     00010980
     1 -ENROLL(1,IYR,I))*TUITN(1,IYR))                                     00011000
      TAB8(6,4,IYEAR)=TAB8(6,4,IYEAR)+((ENASA(2,IYR,I)                     00011020
     1 -ENROLL(2,IYR,I))*TUITN(2,IYR))+((ENASA(3,IYR,I)                    00011040
     2 -ENROLL(3,IYR,I))*TUITN(3,IYR))+((ENASA(4,IYR,I)                    00011060
     3 -ENROLL(4,IYR,I))*TUITN(4,IYR))                                     00011080
      TAB8(7,4,IYEAR)=TAB8(7,4,IYEAR)+((ENASA(5,IYR,I)                     00011100
     1 -ENROLL(5,IYR,I))*TUITN(5,IYR))+((ENASA(6,IYR,I)                    00011120
     2 -ENROLL(6,IYR,I))*TUITN(6,IYR))+((ENASA(7,IYR,I)                    00011140
     3 -ENROLL(7,IYR,I))*TUITN(7,IYR))+((ENASA(8,IYR,I)                    00011160
     4 -ENROLL(8,IYR,I))*TUITN(8,IYR))                                     00011180
      TAB8(8,4,IYEAR)=TAB8(8,4,IYEAR)+((ENASA(9,IYR,I)                     00011200
     1 -ENROLL(9,IYR,I))*TUITN(9,IYR))                                     00011220
  119 CONTINUE                                                             00011240
      IF(PRC.EQ.1) WRITE(6,123) ((TAB8(I,J,IYEAR),J=1,5),I=1,10)           00011260
  123 FORMAT(1X,'TAB8',/,10(1X,5F14.0,/))                                  00011280
      DO 120 I=1,10                                                        00011300
      DO 120 J=1,5                                                         00011320
      TAB9(I,J,IYEAR)=TAB7(I,J,IYEAR)+TAB8(I,J,IYEAR)                      00011340
  120 CONTINUE                                                             00011360
      DO 130 I=5,8                                                         00011380
      DO 130 J=1,5                                                         00011400
      IF(J.EQ.4) GO TO 130                                                 00011420
      DELTA=TAB7(I,J,IYEAR)*TAB8(I,J,IYEAR)                                00011440
      TAB9(I,J,IYEAR)=TAB7(I,J,IYEAR)+TAB8(I,J,IYEAR)                      00011460
      IF(DELTA.LE.0.0) GO TO 130                                           00011480
      SUMA=ABS(TAB7(I,J,IYEAR))                                            00011500
      SUMB=ABS(TAB8(I,J,IYEAR))                                            00011520
      TAB9(I,J,IYEAR)=TAB7(I,J,IYEAR)                                      00011540
      IF(SUMB.GT.SUMA) TAB9(I,J,IYEAR)=TAB8(I,J,IYEAR)                     00011560
  130 CONTINUE                                                             00011580
      IF(PRC.EQ.1) WRITE(6,124) ((TAB9(I,J,IYEAR),J=1,5),I=1,10)           00011600
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 124  FORMAT(1X,'TAB9',/,10(1X,5F14.0,/))                                    00011520
      SUMA=0.0                                                               00011640
      SUMB=0.0                                                               00011660
      DO 121 N=1,5                                                           00011580
      DO 121 J=1,8                                                           00011700
      TAB6(N,IYEAR)=TAB6(N,IYEAR)+TAB9(J,N,IYEAR)                            00011720
 121  CONTINUE                                                               00011740
      TAB10(1,IYEAR)=TAB1(1,IYEAR)                                           00011760
      TAB10(2,IYEAR)=TAB1(2,IYEAR)                                           00011780
      TAB10(3,IYEAR)=FAID(IYEAR)                                             00011800
      TAB10(4,IYEAR)=SAID(IYEAR)                                             00011820
      TAB10(5,IYEAR)=TAB1(3,IYEAR)                                           00011840
      TAB10(6,IYEAR)=TAB1(4,IYEAR)                                           00011860
      TAB10(7,IYEAR)=FEDLOC(IYR)                                             00011880
      TAB10(8,IYEAR)=FEDSTA(IYR)                                             00011900
      TAB10(9,IYEAR)=FEDLOC(IYR)+FEDSTA(IYR)                                 00011920
      TAB10(10,IYEAR)=TUITNW(1,IYR)                                          00011940
      TAB10(11,IYEAR)=TUITNW(2,IYR)                                          00011960
      TAB10(12,IYEAR)=TUITNW(3,IYR)                                          00011980
      TAB10(13,IYEAR)=TUITNW(4,IYR)                                          00012000
      SUMA=0.0                                                               00012020
      SUMB=0.0                                                               00012040
      DO 503 I=5,7                                                           00012060
      DO 503 J=1,11                                                          00012080
      SUMA=SUMA+ENASA(I,IYR,J)                                               00012100
      SUMB=SUMB+(TUITNW(I,IYR)*ENASA(I,IYR,J))                               00012120
 503  CONTINUE                                                               00012140
      TAB10(14,IYEAR)=SUMB/SUMA                                              00012160
      TAB10(15,IYEAR)=TUITNW(8,IYR)                                          00012180
      TAB10(16,IYEAR)=TUITNW(9,IYR)                                          00012200
      TAB10(17,IYEAR)=((TAB2(1,IYEAR+3)/TAB2(1,IYEAR))*100.0)-100.0          00012220
      TAB10(18,IYEAR)=((TAB2(2,IYEAR+3)/TAB2(2,IYEAR))*100.0)-100.0          00012240
      TAB10(19,IYEAR)=((TAB2(3,IYEAR+3)/TAB2(3,IYEAR))*100.0)-100.0          00012260
      TAB10(20,IYEAR)=((TAB2(4,IYEAR+3)/TAB2(4,IYEAR))*100.0)-100.0          00012280
      TAB10(21,IYEAR)=(((TAB2(5,IYEAR+3)+TAB2(6,IYEAR+3)+                    00012300
     1 TAB2(7,IYEAR+3))/(TAB2(5,IYEAR)+TAB2(6,IYEAR)+TAB2(7,                 00012320
     2 IYEAR)))*100.0)-100.0                                                 00012340
      TAB10(22,IYEAR)=((TAB2(8,IYEAR+3)/TAB2(8,IYEAR))*100.0)-100.0          00012360
      TAB10(23,IYEAR)=((TAB2(9,IYEAR+3)/TAB2(9,IYEAR))*100.0)-100.0          00012380
      SUMA=0.0                                                               00012400
      SUMB=0.0                                                               00012420
      DO 502 I=1,8                                                           00012440
      SUMA=TAB4(I,IYEAR)+SUMA                                                00012460
      SUMB=TAB4(I,IYEAR+3)+SUMB                                              00012480
 502  CONTINUE                                                               00012500
      TAB10(24,IYEAR)=((SUMB/SUMA)*100.0)-100.0                              00012520
      TAB10(25,IYEAR)=((TAB4(9,IYEAR+3)/TAB4(9,IYEAR))*100.0)-100.0          00012540
      TAB10(26,IYEAR)=(((TAB4(10,IYEAR+3)+TAB4(11,IYEAR+3))/                 00012560
     1 (TAB4(10,IYEAR)+TAB4(11,IYEAR)))*100.0)-100.0                         00012580
      TAB10(27,IYEAR)=TAB6(1,IYEAR)                                          00012600
      TAB10(28,IYEAR)=TAB6(2,IYEAR)                                          00012620
      TAB10(29,IYEAR)=TAB6(3,IYEAR)                                          00012640
      TAB10(30,IYEAR)=TAB6(1,IYEAR)+TAB6(2,IYEAR)+TAB6(3,IYEAR)              00012660
      TAB10(31,IYEAR)=TAB6(5,IYEAR)                                          00012680
      TAB10(32,IYEAR)=TAB6(4,IYEAR)                                          00012700
      TAB10(33,IYEAR)=TAB10(30,IYEAR)+TAB6(4,IYEAR)+TAB6(5,IYEAR)            00012720
C     CHANGED TAB9(2,... TO TAB9(1,... TO GET PLUS VALUE  JF 11/12/73        00012735
      TAB10(34,IYEAR)=TAB9(1,4,IYEAR)                                        00012740
      DO 230  I=1,9                                                          00012760
```


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```
      DO 230 J=1,11                                                    00012780
      SUMA=SUMA+ENROLL(I,IYR,J)                                        00012800
      SUMB=SUMB+ENA[illegible]I,IYR,J)                                 00012820
230   CONTINUE                                                         00012840
      DELTA=SUMB-SUMA                                                  00012860
      IF(DELTA.LE.0.0) GO TO 231                                       00012880
      DO 232 N=1,5                                                     00012900
232   TAB6(N,IYEAR)=TAB6(N,IYEAR)/DELTA                                00012920
      GO TO 233                                                        00012940
231   DO 234 N=1,5                                                     00012960
234   TAB6(N,IYEAR)=-1.0                                               00012980
233   CONTINUE                                                         00013000
      IF(PRC.EQ.1) WRITE(6,225) ((TAB6(I,J),J=1,3),I=1,5)              00013020
 225  FORMAT(1X,'TAB6',/,5(1X,3F15.9,/))                               00013040
20    CONTINUE                                                         00013060
      YEAR1=1973 + YEAR1                                               00013080
      YEAR2=1973 + YEAR2                                               00013100
      YEAR3=1973 + YEAR3                                               00013120
      WRITE(4,91) RNAME,DESCRP,TAB1,TAB2,TAB3,TAB4,TAB5,               00013140
     1 TAB6,TAB7,TAB8,TAB9,YEAR1,YEAR2,YEAR3,PRTCUT,AIDCUT             00013160
     2 ,IPAG,VERSN,TIME,DATE,INIT,FAID,SAID,TAB10,FKOD                 00013180
91    FORMAT(10A4,/,12(18A4,/),166(5F16.2,/),4F16.2,/,3I6,2F10.0,      00013200
     1 /,20I3,/,F4.1,5A4,/,6F10.0,/,20(5F16.2,/),2F16.2,3I2)          00013220
      WRITE(6,999)                                                     00013240
C      PROGRAM IDENTIFIER ADDED  JF 11/12/73                           00013255
999   FORMAT(1X,'NCFP03 I  EXECUTION OF MDL.FORT COMPLETED')           00013260
      STOP                                                             00013280
      END                                                              00013300
```

(Appendix F, continued)

RPT

```
C     THIS IS THE REPORT MODULE FOR THE NATIONAL COMMISSION'S                00000010
C     MODEL.  THE PROGRAM READS THE DATA FROM FILE 'IN' AND                  00000020
C     PRODUCES A FORMATED REPORT OUTPUT.                                     00000030
C                                                                            00000040
C                                                                            00000050
      INTEGER IN, OUT                                                        00000060
      INTEGER PAGE, IPAG                                                     00000070
      INTEGER YEAR1, YEAR2, YEAR3                                            00000080
      INTEGER FKOD                                                           00000090
      DIMENSION RNAME(10), DESCRP(18,12)                                     00000100
      DIMENSION TAB1(7,3), TAB2(18,6), TAB4(11,6)                            00000110
      DIMENSION TAB3(18,6)                                                   00000120
      DIMENSION TAB5(11,6), TAB6(5,3), TAB7(10,5,3)                          00000130
      DIMENSION TAB8(10,5,3), TAB9(10,5,3), TAB10(34,3)                      00000140
      DIMENSION TOTAL(6), TOTALX(6)                                          00000150
      DIMENSION YEARS(3)                                                     00000160
      DIMENSION IPAG(20), TIME(2), DATE(2)                                   00000170
      DIMENSION FAID(3), SAID(3), FKOD(3)                                    00000180
      DIMENSION TYPDES(5,6)                                                  00000190
      REAL YEARS                                                             00000200
      REAL TOTAL, TOTALX                                                     00000210
      REAL RNAME, DESCRP                                                     00000220
      REAL TAB1, TAB2, TAB3, TAB4, TAB5, TAB6, TAB7, TAB8                    00000230
      REAL TAB9, TAB10                                                       00000240
      REAL PRTCUT                                                            00000250
      REAL AIDCUT                                                            00000260
      REAL VERSN, TIME, DATE, INIT                                           00000270
      REAL FAID, SAID                                                        00000280
      REAL RYEAR, TEST1, TEST2, ATEST                                        00000290
      REAL TYPDES                                                            00000300
      DATA TEST1 /1HA/, TEST2 /3HALL/                                        00000310
      DATA TYPDES /'(BLO', 'CK G', 'RANT', ')   ', '    ',                   00000320
     *             '(CAP', 'ITAT', 'ION)', '    ', '    ',                 00000330
     *             '(PER', ' STU', 'DENT', ' AID', 'ED) ',                  00000340
     *             '(MIX', 'ED T', 'YPES', ')   ', '    ',                  00000350
     *             '(NON', 'E SP', 'ECIF', 'IED)', '    ',                  00000360
     *             '(NON', 'E)  ', '    ', '    ', '    '/                 00000370
C                                                                            00000380
C                                                                            00000390
C     INDENTIFYING UNIT NUMBER FOR TERMINAL                                  00000400
      INT = 5                                                                00000410
      OUT = 6                                                                00000420
C                                                                            00000430
C                                                                            00000440
C     BEGINNING TO READ THE INPUT FROM THE MODEL PROGRAM'S OUTPUT            00000450
C                                                                            00000460
C                                                                            00000470
      IN=4                                                                   00000480
      READ(IN,100) RNAME, DESCRP, TAB1, TAB2, TAB3, TAB4, TAB5,              00000490
     *TAB6, TAB7, TAB8, TAB9, YEAR1, YEAR2, YEAR3, PRTCUT, AIDCUT,           00000500
     *IPAG, VERSN, TIME, DATE, INIT, FAID, SAID, TAB10, FKOD                 00000510
100   FORMAT (10A4, /, 12(18A4,/), 166(5F16.2,/), 4F16.2, /, 3I6,            00000520
     *2F10.0, / 20I3, /, F4.1, 2A4, 2A4, A4 / 6F10.0 / 20(5F16.2,/),         00000530
     *2F16.2, 3I2)                                                           00000540
C     CHANGING FORM OF YEAR                                                  00000550
      YEARS(1) = YEAR1                                                       00000560
      YEARS(2) = YEAR2                                                       00000570
      YEARS(3) = YEAR3                                                       00000580
      ILEVEL = PRTCUT                                                        00000590
```

RPT

```
      WRITE(OUT,197)                                                    00000590
197   FORMAT (1X, 'NCFP05 A  SET ONE SPACE ABOVE TOP OF PAGE, ',        00000610
     *'CARRIAGE RETURN FOR OUTPUT')                                     00000620
      READ(INT,198) ATEST                                               00000630
198   FORMAT (1X, 1A4)                                                  00000640
C                                                                       00000650
C                                                                       00000660
C     THIS IS THE CONTROL SECTION FOR SELECTING REPORT SEQUENCE         00000670
C     AND DEPENDS UPON CONTROL PARAMETERS PASSED FROM MDL.              00000680
C                                                                       00000690
C     TESTING TO SEE IF MATRIX IPAG NON-ZERO                            00000700
C     IF SO, THEN TABLE NUMBERS ARE ADDED, ELSE                         00000710
C     USED AS AVAILABLE                                                 00000720
      IF ((ATEST .EQ. TEST1) .OR. (ATEST .EQ. TEST2)) GO TO 64          00000730
      DO 63 I = 1,20                                                    00000740
      IF (IPAG(I) .NE. 0) GO TO 69                                      00000750
63    CONTINUE                                                          00000760
64    DO 65 I = 1,20                                                    00000770
      IPAG(I) = I                                                       00000780
65    CONTINUE                                                          00000790
69    PAGE = 1                                                          00000800
      GO TO 71                                                          00000810
73    PAGE = PAGE + 1                                                   00000820
      DO 75 ICON = 1,20                                                 00000830
      ITAB = IPAG(ICON)                                                 00000840
      IF (ITAB .EQ. 1) GO TO 1                                          00000850
      IF (ITAB .EQ. 2) GO TO 2                                          00000860
      IF (ITAB .EQ. 3) GO TO 3                                          00000870
      IF (ITAB .EQ. 4) GO TO 4                                          00000880
      IF (ITAB .EQ. 5) GO TO 5                                          00000890
      IF (ITAB .EQ. 6) GO TO 6                                          00000900
      IF (ITAB .EQ. 7) GO TO 6                                          00000910
      IF (ITAB .EQ. 8)  GO TO 6                                         00000920
75    CONTINUE                                                          00000930
      GO TO 999                                                         00000940
79    PAGE = PAGE + 1                                                   00000950
      GO TO 75                                                          00000960
C                                                                       00000970
C     THE VALUES FOR ALL TABLES HAVE BEEN READ INTO CORE.  FROM         00000980
C     THIS POINT ON IT IS MERELY LISTING THESE OUT IN A FORMATTED       00000990
C     REPORT.                                                           00001000
C                                                                       00001010
C                                                                       00001020
71    CONTINUE                                                          00001030
C                                                                       00001040
      WRITE(OUT,101)                                                    00001050
101   FORMAT(1H1)                                                       00001060
      WRITE(OUT,251)                                                    00001070
      WRITE(OUT,104)                                                    00001080
103   FORMAT(1X, /, /)                                                  00001090
104   FORMAT (1X, /)                                                    00001100
      WRITE(OUT,105) PAGE                                               00001110
105   FORMAT (1X, 'NCFP05 ', 11X, 'NATIONAL COMMISSION ON THE FINANCING'00001120
     *, 12X, 'PAGE', 1X, I1)                                            00001130
      WRITE(OUT,107) VERSN,DATE                                         00001140
107   FORMAT (1X, 'VER', F4.1, 16X, 'OF POSTSECONDARY EDUCATION',       00001150
     *15X, 2A4)                                                         00001160
      WRITE(OUT, 109) INIT, TIME                                        00001170
109   FORMAT (1X, A4, 60X, 2A4)                                         00001180
```

```
      WRITE(OUT,111) RNAME                                                  00001190
111   FORMAT (1X, 4X, 'ANALYSIS OF ', 10A4)                                 00001200
      WRITE(OUT,113) YEAR1, YEAR2, YEAR3                                    00001210
113   FORMAT (1X, 4X, 'FOR YEARS ', I4, ', ', I4, ', ', I4)                 00001220
      WRITE(OUT, 104)                                                       00001230
      WRITE(OUT,121)                                                        00001240
121   FORMAT(1X, 12X, 'THE FOLLOWING TABLES PRESENT AN ANALYSIS OF THE  00001250
     *   ')                                                                 00001260
      WRITE(OUT,122)                                                        00001270
122   FORMAT (1X, 12X, 'ALTERNATIVE FINANCING PROPOSAL IDENTIFIED ABOVE.00001280
     *')                                                                   00001290
      WRITE(OUT, 123)                                                       00001300
123   FORMAT (1X, 12X, 'A COMMON SET OF BASE DATA IS USED (FOR COMPARATI00001310
     *VE')                                                                 00001320
      WRITE(OUT,124)                                                        00001330
124   FORMAT (1X, 12X, 'PURPOSES) IN THE ESTIMATION OF THE ENROLLMENT AN00001340
     *D ')                                                                 00001350
      WRITE(OUT, 125)                                                       00001360
125   FORMAT (1X, 12X, 'FINANCIAL IMPLICATIONS OF EACH ALTERNATIVE. THES00001370
     *E ')                                                                 00001380
      WRITE(OUT,126)                                                        00001390
126   FORMAT(1X, 12X, '"BASELINE" DATA ARE SHOWN IN THE FOLLOWING TABLES00001400
     * ')                                                                  00001410
      WRITE(OUT,127)                                                        00001420
127   FORMAT (1X, 12X, 'FOR COMPARATIVE PURPOSES.  IN ADDITION, THE    ')00001430
      WRITE(OUT,128) RNAME                                                  00001440
128   FORMAT (1X, 12X, 10A4, ' PROPOSAL')                                   00001450
      WRITE(OUT, 129)                                                       00001460
129   FORMAT (1X, 12X, 'INCLUDES THE FOLLOWING POLICY ASSUMPTIONS AND 00000001470
     *ULD')                                                                00001480
      WRITE(OUT,1292)                                                       00001490
1292  FORMAT(1X, 12X, 'RESULT IN THE FOLLOWING IMPACTS:')                   00001500
      WRITE(OUT,104)                                                        00001510
      WRITE(OUT,131) YEAR1, YEAR2, YEAR3                                    00001520
131   FORMAT (1X, 37X, 3X, I4, 8X, I4, 8X, I4)                              00001530
      WRITE(OUT,133)                                                        00001540
133   FORMAT (1X, 4X, 'FINANCING CHANGES: ', /)                             00001550
      WRITE(OUT,135) (TAB1(1,I), I=1,3)                                     00001560
135   FORMAT (1X, 6X, 'FEDERAL STUDENT AID ', 10X, 3F12.0)                  00001570
      WRITE(OUT,136) FAID                                                   00001580
136   FORMAT (1X, 8X, 'MAX ELIGIBLE FAMILY INCOME  ', 3F12.0)               00001590
      WRITE(OUT,137) (TAB1(2,I), I=1,3)                                     00001600
137   FORMAT (1X, 6X, 'STATE STUDENT AID ', 12X, 3F12.0)                    00001610
      WRITE(OUT,136) SAID                                                   00001620
      WRITE(OUT,139) (TAB1(3,I), I=1,3)                                     00001630
139   FORMAT (1X, 6X, 'FEDERAL INSTITUTIONAL AID ', 4X, 3F12.0)             00001640
      K = 5                                                                 00001650
      IF (FKOD(1) .EQ. 0) K = 6                                             00001660
      IF (FKOD(1) .EQ. 1) K = 1                                             00001670
      IF (FKOD(1) .EQ. 2) K = 2                                             00001680
      IF (FKOD(1) .EQ. 3) K = 3                                             00001690
      IF (FKOD(1) .EQ. 4) K = 4                                             00001700
      WRITE(OUT,140) (TYPDES(J,K), J = 1,5)                                 00001710
140   FORMAT (1X, 8X, 5A4)                                                  00001720
      WRITE(OUT,141) (TAB1(4,I), I=1,3)                                     00001730
      K = 5                                                                 00001740
      IF (FKOD(2) .EQ. 0) K = 6                                             00001750
      IF (FKOD(2) .EQ. 1) K = 1                                             00001760
      IF (FKOD(2) .EQ. 2) K = 2                                             00001770
```

```
      IF (FKOD(2) .EQ. 3) K = 3                                          00001780
      IF (FKOD(2) .EQ. 4) K = 4                                          00001790
      WRITE(OUT,142) (TYPDES(J,K), J = 1,5)                              00001800
142   FORMAT (1X, 8X, 5A4)                                               00001810
141   FORMAT (1X, 6X, 'STATE INSTITUTIONAL AID ', 6X, 3F12.0)            00001820
      WRITE(OUT,143) (TAB1(5,I), I=1,3)                                  00001830
143   FORMAT (1X, 6X, 'TUITION AT PUBLIC INSTITUTIONS', 3F12.0)          00001840
      WRITE(OUT,145) (TAB1(6,I), I=1,3)                                  00001850
145   FORMAT (1X, 6X, 'FEDERAL AID TO STATES', 9X, 3F12.0)               00001860
      WRITE(OUT,147) (TAB1(7,I), I=1,3)                                  00001870
147   FORMAT (1X, 6X, 'FEDERAL AID TO LOCAL GOV ', 5X, 3F12.0, /, /)     00001880
      WRITE(OUT, 151)                                                    00001890
151   FORMAT (1X, 4X, 'SUMMARY IMPACT MEASURES:', /)                     00001900
      WRITE(OUT,153)                                                     00001910
153   FORMAT (1X, 6X, 'PERCENT CHANGES FROM BASE ENROLLMENT')            00001920
      DO 155 K = 1,6                                                     00001930
155   TOTAL(K) = 0.0                                                     00001940
      DO 157 K = 1,3                                                     00001950
      IF (TAB2(1,K) .EQ. 0) GO TO 1572                                   00001960
      TOTAL(K) = 100 * (TAB2(1,K+3) - TAB2(1,K)) / TAB2(1,K)             00001970
157   CONTINUE                                                           00001980
      GO TO 1574                                                         00001990
1572  TOTAL(K) = 0.0                                                     00002000
      GO TO 157                                                          00002010
1574  CONTINUE                                                           00002020
      WRITE(OUT,159) (TOTAL(I), I=1,3)                                   00002030
159   FORMAT (1X, 8X, 'PUBLIC 2 YR COLLEGES', 8X, 3F12.2)               00002040
      DO 161 K = 1,6                                                     00002050
      TOTAL(K)  = 0.0                                                    00002060
161   TOTALX(K) = 0.0                                                    00002070
      DO 163 K = 1,3                                                     00002080
      DO 163 J = 2,4                                                     00002090
      TOTAL(K) = (TAB2(J,K+3) - TAB2(J,K)) + TOTAL(K)                    00002100
163   TOTALX(K) = TOTALX(K) + TAB2(J,K)                                  00002110
      DO 165 K = 1,3                                                     00002120
      IF(TOTALX(K) .EQ. 0) GO TO 1652                                    00002130
      TOTAL(K) = 100 * TOTAL(K) / TOTALX(K)                              00002140
165   CONTINUE                                                           00002150
      GO TO 1678                                                         00002160
1652  TOTAL(K) = 0.0                                                     00002170
      GO TO 165                                                          00002180
1678  WRITE(OUT,167) (TOTAL(I), I = 1,3)                                 00002190
167   FORMAT (1X, 8X, 'PUBLIC 4 YR COLLEGES', 8X, 3F12.2)               00002200
      DO 169 K = 1,6                                                     00002210
      TOTAL(K)  = 0.0                                                    00002220
169   TOTALX(K) = 0.0                                                    00002230
      DO 171 K = 1,3                                                     00002240
      DO 171 J = 5,8                                                     00002250
      TOTAL(K) = (TAB2(J,K+3) - TAB2(J,K)) + TOTAL(K)                    00002260
171   TOTALX(K) = TOTALX(K) + TAB2(J,K)                                  00002270
      DO 173 K = 1,6                                                     00002280
      IF(TOTALX(K) .EQ. 0) GO TO 1732                                    00002290
      TOTAL(K) = 100 * TOTAL(K) / TOTALX(K)                              00002300
173   CONTINUE                                                           00002310
      GO TO 1738                                                         00002320
1732  TOTAL(K) = 0.0                                                     00002330
      GO TO 173                                                          00002340
1738  WRITE(OUT,175) (TOTAL(I), I=1,3)                                   00002350
175   FORMAT (1X, 8X, 'PRIVATE COLLEGES, ALL', 7X, 3F12.2)               00002360
```

RPT

```
      DO 177 K = 1,3                                                    00002370
      IF (TAB2(9,K) .EQ. 0) GO TO 1772                                  00002380
      TOTAL(K) = 100 * (TAB2(9,K+3) - TAB2(9,K)) / TAB2(9,K)            00002390
177   CONTINUE                                                          00002400
      GO TO 1798                                                        00002410
1772  TOTAL(K) = 0.0                                                    00002420
      GO TO 177                                                         00002430
1798  WRITE(OUT,179) (TOTAL(I), I=1,3)                                  00002440
179   FORMAT (1X, 8X, 'NONCOLLEGIATE', 15X, 3F12.2)                     00002450
      DO 181 K = 1,6                                                    00002460
      TOTAL(K)  = 0.0                                                   00002470
181   TOTALX(K) = 0.0                                                   00002480
      DO 183 K = 1,6                                                    00002490
      DO 183 J = 1,8                                                    00002500
183   TOTAL(K) = TAB4(J,K) + TOTAL(K)                                   00002510
      DO 185 K = 1,3                                                    00002520
      IF (TOTAL(K) .EQ. 0) GO TO 1852                                   00002530
      TOTAL(K) = 100 * (TOTAL(K+3) - TOTAL(K)) / TOTAL(K)               00002540
185   CONTINUE                                                          00002550
      GO TO 1858                                                        00002560
1852  TOTAL(K) = 0.0                                                    00002570
      GO TO 185                                                         00002580
1858  WRITE(OUT,187) (TOTAL(I), I=1,3)                                  00002590
187   FORMAT (1X, 8X, 'UNDERGRADUATE, UNDER $10,000', 3F12.2)           00002600
      DO 189 K = 1,6                                                    00002610
189   TOTAL(K) = 0.0                                                    00002620
      DO 191 K = 1,3                                                    00002630
      IF (TAB4(9,K) .EQ. 0) GO TO 191                                   00002640
      TOTAL(K) = 100 * (TAB4(9,K+3) - TAB4(9,K)) / TAB4(9,K)            00002650
191   CONTINUE                                                          00002660
      WRITE(OUT,193) (TOTAL(I), I=1,3)                                  00002670
193   FORMAT (1X, 8X, 'UNDERGRADUATE, $10-14,999', 3X, 3F12.2)          00002680
      DO 901 K = 1,6                                                    00002690
901   TOTAL(K) = 0.0                                                    00002700
      DO 903 K = 1,6                                                    00002710
      DO 903 J = 10,11                                                  00002720
903   TOTAL(K) = TAB4(J,K) + TOTAL(K)                                   00002730
      DO 905 K = 1,3                                                    00002740
      IF (TOTAL(K) .EQ. 0) GO TO 9052                                   00002750
      TOTAL(K) = 100 * (TOTAL(K+3) - TOTAL(K)) / TOTAL(K)               00002760
905   CONTINUE                                                          00002770
      GO TO 9058                                                        00002780
9052  TOTAL(K) = 0.0                                                    00002790
      GO TO 905                                                         00002800
9058  WRITE(OUT,907) (TOTAL(I), I=1,3)                                  00002810
907   FORMAT (1X, 8X, 'UNDERGRADUATE, $15,000 & OVER',                  00002820
     *1F11.2, 2F12.2)                                                   00002830
      DO 909 K = 1,6                                                    00002840
      TOTAL(K)  = 0.0                                                   00002850
909   TOTALX(K) = 0.0                                                   00002860
      DO 911 J = 1,11                                                   00002870
      DO 911 K = 1,6                                                    00002880
      TOTAL(K) = TAB4(J,K) + TOTAL(K)                                   00002890
911   TOTALX(K) = (TAB4(J,K) * TAB5(J,K)) + TOTALX(K)                   00002900
      DO 913  K = 1,3                                                   00002910
      IF (TOTAL(K) .EQ. 0) GO TO 9132                                   00002920
      B = TOTALX(K) / TOTAL(K)                                          00002930
9114  IF (TOTAL(K+3) .EQ. 0) GO TO 9134                                 00002940
      A = TOTALX(K+3) / TOTAL(K+3)                                      00002950
```

RPT

```
9116  TOTAL(K) = A + B                                                    00002960
913   CONTINUE                                                            00002970
      GO TO 9138                                                          00002980
9132  B = 0.0                                                             00002990
      GO TO 9114                                                          00003000
9134  A = 0.0                                                             00003010
      GO TO 9116                                                          00003020
9138  WRITE(OUT,915) (TOTAL(K), K=1,3)                                    00003030
915   FORMAT(1X, /, 1X, 6X, 'AVERAGE U.G. GRANT INCREASE- $', 3F12.2)     00003040
      WRITE(OUT,207)                                                      00003050
      WRITE(OUT,195) (DESCRP(I,1), I=1,18)                                00003060
195   FORMAT (1X, 18A4)                                                   00003070
      WRITE(OUT,195) (DESCRP(I,2), I=1,18)                                00003080
      WRITE(OUT,195) (DESCRP(I,3), I=1,18)                                00003090
      WRITE(OUT,195) (DESCRP(I,4), I=1,18)                                00003100
      WRITE(OUT,195) (DESCRP(I,5), I=1,18)                                00003110
      WRITE(OUT,195) (DESCRP(I,6), I=1,18)                                00003120
      WRITE(OUT,195) (DESCRP(I,7), I=1,18)                                00003130
      WRITE(OUT,195) (DESCRP(I,8), I=1,18)                                00003140
      WRITE(OUT,195) (DESCRP(I,9), I=1,18)                                00003150
      WRITE(OUT,195) (DESCRP(I,11), I=1,18)                               00003160
      WRITE(OUT,195) (DESCRP(I,12), I=1,18)                               00003170
      WRITE(OUT,104)                                                      00003180
      WRITE(OUT,251)                                                      00003190
      GO TO 73                                                            00003200
C                                                                         00003210
C                                                                         00003220
C     BEGINNING PAGE 3 - TABLE 2A                                         00003230
C                                                                         00003240
C                                                                         00003250
2     CONTINUE                                                            00003260
      WRITE(OUT,101)                                                      00003270
      WRITE(OUT,104)                                                      00003280
      WRITE(OUT,105) PAGE                                                 00003290
      WRITE(OUT,107) VERSN, DATE                                          00003300
      WRITE(OUT,109) INIT, TIME                                           00003310
      WRITE(OUT,111) RNAME                                                00003320
      WRITE(OUT,113) YEAR1, YEAR2, YEAR3                                  00003330
      WRITE(OUT,201)                                                      00003340
201   FORMAT (1X, /, 1X, 32X, 'TABLE 2A', /)                              00003350
      WRITE(OUT,203)                                                      00003360
203   FORMAT (1X, '---MEASURES---', 2X,                                   00003370
     *'---------BASELINE----------', 2X,                                 00003380
     *'---------ALTERNATIVE--------')                                    00003390
      WRITE(OUT,205) YEAR1, YEAR2, YEAR3, YEAR1, YEAR2, YEAR3             00003400
205   FORMAT (1X, 14X, 2X, 3X, I4, 2X, 3X, I4, 2X, 3X, I4, 2X,           00003410
     *2X, 3X, I4, 2X, 3X, I4, 2X, 3X, I4)                                 00003420
207   FORMAT (1X, /)                                                      00003430
      WRITE(OUT,209)                                                      00003440
209   FORMAT(1X, 'ENROLLMENT', /)                                         00003450
      WRITE(OUT,211) (TAB2(1,I), I=1,6)                                   00003460
211   FORMAT (1X, 'PUBLIC 2 YR   ', 2X, 3F9.0, 2X, 3F9.0)                00003470
      WRITE(OUT,213)                                                      00003480
213   FORMAT (1X, 'PUBLIC 4 YR   ')                                       00003490
      WRITE(OUT,215) (TAB2(2,I), I=1,6)                                   00003500
215   FORMAT (1X, '    LOWER DIV ', 2X, 3F9.0, 2X, 3F9.0)                00003510
      WRITE(OUT,217) (TAB2(3,I), I=1,6)                                   00003520
217   FORMAT (1X, '    UPPER DIV ', 2X, 3F9.0, 2X, 3F9.0)                00003530
      WRITE(OUT,219) (TAB2(4,I), I=1,6)                                   00003540
```

```
219   FORMAT (1X, '    GRADUATE  ', 2X, 3F9.0, 2X, 3F9.0)                  00003550
      DO 220 K = 1,6                                                       00003560
220   TOTAL(K) = 0.0                                                       00003570
      DO 2201 K = 1,6                                                      00003580
      DO 2201 J = 1,4                                                      00003590
2201  TOTAL(K) = TOTAL(K) + TAB2(J,K)                                      00003600
      WRITE(OUT,221) TOTAL                                                 00003610
221   FORMAT(1X, '*  SUBTOTAL   ', 2X, 3F9.0, 2X, 3F9.0,/)                00003620
      WRITE(OUT,223) (TAB2(5,I), I=1,6)                                    00003630
223   FORMAT (1X, 'PRIVATE 2YR   ', 2X, 3F9.0, 2X, 3F9.0)                  00003640
      WRITE(OUT,225)                                                       00003650
225   FORMAT (1X, 'PRIVATE 4YR   ', 2X)                                    00003660
      WRITE(OUT,227) (TAB2(6,I), I=1,6)                                    00003670
227   FORMAT (1X, '    LOWER DIV ', 2X, 3F9.0, 2X, 3F9.0)                  00003680
      WRITE(OUT,229) (TAB2(7,I), I=1,6)                                    00003690
229   FORMAT (1X, '    UPPER DIV ', 2X, 3F9.0, 2X, 3F9.0)                  00003700
      WRITE(OUT,231) (TAB2(8,I), I=1,6)                                    00003710
231   FORMAT (1X, '    GRADUATE  ', 2X, 3F9.0, 2X, 3F9.0)                  00003720
      DO 233  K = 1,6                                                      00003730
233   TOTAL(K) = 0.0                                                       00003740
      DO 235  K = 1,6                                                      00003750
      DO 235  J = 5,8                                                      00003760
235   TOTAL(K) = TOTAL(K) + TAB2(J,K)                                      00003770
      WRITE(OUT,237) TOTAL                                                 00003780
237   FORMAT (1X, '*  SUBTOTAL   ', 2X, 3F9.0, 2X, 3F9.0, /)               00003790
      WRITE(OUT,239) (TAB2(9,I), I=1,6)                                    00003800
239   FORMAT (1X, 'NONCOLLEGIATE ', 2X, 3F9.0, 2X, 3F9.0)                  00003810
      DO 241  K = 1,6                                                      00003820
241   TOTAL(K) = 0.0                                                       00003830
      DO 243  K = 1,6                                                      00003840
      DO 243  J = 1,9                                                      00003850
243   TOTAL(K) = TOTAL(K) + TAB2(J,K)                                      00003860
      WRITE(OUT,245) TOTAL                                                 00003870
245   FORMAT (1X, /, 1X, '** TOTAL       ', 2X, 3F9.0, 2X, 3F9.0)          00003880
      WRITE(OUT,251)                                                       00003890
251   FORMAT (1X, /, 1X, 72('-'))                                          00003900
C                                                                          00003910
C                                                                          00003920
C     BEGINNING PAGE 3 - TABLE 28                                          00003930
C                                                                          00003940
C                                                                          00003950
      WRITE(OUT,252)                                                       00003960
252   FORMAT (1X, /, /, 1X, 32X, 'TABLE 28', /)                            00003970
      WRITE(OUT,203)                                                       00003980
      WRITE(OUT,205) YEAR1, YEAR2, YEAR3, YEAR1, YEAR2, YEAR3              00003990
      WRITE(OUT,253)                                                       00004000
253   FORMAT (1X, /, 1X, 'PERCENT OF ENROLLMENT')                          00004010
      WRITE(OUT,255) ILEVEL                                                00004020
255   FORMAT (1X, 'BELOW INCOME LEVEL - $ ', I6,/)                         00004030
      WRITE(OUT,257) (TAB2(10,I), I=1,6)                                   00004040
257   FORMAT (1X, 'PUBLIC 2 YR   ', 2X, 3F9.2, 2X, 3F9.2)                  00004050
      WRITE(OUT,259)                                                       00004060
259   FORMAT (1X, 'PUBLIC 4 YR   ')                                        00004070
      WRITE(OUT,261) (TAB2(11,I), I=1,6)                                   00004080
261   FORMAT (1X, '    LOWER DIV ', 2X, 3F9.2, 2X, 3F9.2)                  00004090
      WRITE(OUT,263) (TAB2(12,I), I=1,6)                                   00004100
263   FORMAT (1X, '    UPPER DIV ', 2X, 3F9.2, 2X, 3F9.2)                  00004110
      WRITE(OUT,265) (TAB2(13,I), I=1,6)                                   00004120
265   FORMAT (1X, '    GRADUATE  ', 2X, 3F9.2, 2X, 3F9.2)                  00004130
```

```
      DO 267  K = 1,6                                                    00004140
      TOTALX(K) = 0.0                                                    00004150
267   TOTAL(K)  = 0.0                                                    00004160
      DO 269  J = 10,13                                                  00004170
      DO 269  K = 1,6                                                    00004180
      TOTAL(K) = TOTAL(K) + TAB2(J-9,K)                                  00004190
269   TOTALX(K) = TOTALX(K) + (TAB2(J-9,K) * TAB2(J,K))                  00004200
      DO 270  K = 1,6                                                    00004210
      IF (TOTAL(K) .EQ. 0)  GO TO 270                                    00004220
      TOTAL(K) = TOTALX(K) / TOTAL(K)                                    00004230
270   CONTINUE                                                           00004240
      WRITE(OUT,271) TOTAL                                               00004250
271   FORMAT (1X, '*  AVERAGE     ', 2X, 3F9.2, 2X, 3F9.2, /)           00004260
      WRITE(OUT,273) (TAB2(14,I), I=1,6)                                 00004270
273   FORMAT (1X, 'PRIVATE 2YR    ', 2X, 3F9.2, 2X, 3F9.2)              00004280
      WRITE(OUT,275)                                                     00004290
275   FORMAT (1X, 'PRIVATE 4YR    ')                                     00004300
      WRITE(OUT,277) (TAB2(15,I), I=1,6)                                 00004310
277   FORMAT (1X, '    LOWER DIV ', 2X, 3F9.2, 2X, 3F9.2)                00004320
      WRITE(OUT,279) (TAB2(16,I), I=1,6)                                 00004330
279   FORMAT (1X, '    UPPER DIV ', 2X, 3F9.2, 2X, 3F9.2)                00004340
      WRITE(OUT,281) (TAB2(17,I), I=1,6)                                 00004350
281   FORMAT (1X, '    GRADUATE  ', 2X, 3F9.2, 2X, 3F9.2)                00004360
      DO 283  K = 1,6                                                    00004370
      TOTAL(K)  = 0.0                                                    00004380
283   TOTALX(K) = 0.0                                                    00004390
      DO 285  J = 14,17                                                  00004400
      DO 285  K = 1,6                                                    00004410
      TOTAL(K) = TOTAL(K) + TAB2(J-9,K)                                  00004420
285   TOTALX(K) = TOTALX(K) + (TAB2(J-9,K) * TAB2(J,K))                  00004430
      DO 286  K = 1,6                                                    00004440
      IF (TOTAL(K) .EQ. 0) GO TO 286                                     00004450
      TOTAL(K) = TOTALX(K) / TOTAL(K)                                    00004460
286   CONTINUE                                                           00004470
      WRITE(OUT,287) TOTAL                                               00004480
287   FORMAT (1X, '*  AVERAGE     ', 2X, 3F9.2, 2X, 3F9.2, /)           00004490
      WRITE(OUT,289) (TAB2(18,I), I=1,6)                                 00004500
289   FORMAT (1X, 'NONCOLLEGIATE ', 2X, 3F9.2, 2X, 3F9.2)               00004510
      DO 291  K = 1,6                                                    00004520
      TOTAL(K)  = 0.0                                                    00004530
291   TOTALX(K) = 0.0                                                    00004540
      DO 293  K = 1,6                                                    00004550
      DO 293  J = 10,18                                                  00004560
      TOTAL(K) = TOTAL(K) + TAB2(J-9,K)                                  00004570
293   TOTALX(K) = ((TAB2(J-9,K) * TAB2(J,K)) + TOTALX(K) )               00004580
      DO 294  K = 1,6                                                    00004590
      IF (TOTAL(K) .EQ. 0) GO TO 294                                     00004600
      TOTAL(K) = TOTALX(K) / TOTAL(K)                                    00004610
294   CONTINUE                                                           00004620
      WRITE(OUT,295) TOTAL                                               00004630
295   FORMAT (1X, /, 1X, '** AVERAGE     ', 2X, 3F9.2, 2X, 3F9.2)        00004640
      WRITE(OUT,103)                                                     00004650
      WRITE(OUT,251)                                                     00004660
      GO TO 79                                                           00004670
C                                                                        00004680
C                                                                        00004690
C     BEGINNING PAGE 4 - TABLE 3A                                        00004700
C                                                                        00004710
C                                                                        00004720
```

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3     CONTINUE                                                          00004730
      WRITE(OUT,101)                                                    00004740
      WRITE(OUT,104)                                                    00004750
      WRITE(OUT,105) PAGE                                               00004760
      WRITE(OUT,107) VERSN, DATE                                        00004770
      WRITE(OUT,109) INIT, TIME                                         00004780
      WRITE(OUT,111) RNAME                                              00004790
      WRITE(OUT,113) YEAR1, YEAR2, YEAR3                                00004800
      WRITE(OUT,301)                                                    00004810
301   FORMAT (1X, /, 1X, 30X, 'TABLE 3A', /)                            00004820
      WRITE(OUT,203)                                                    00004830
      WRITE(OUT,205) YEAR1, YEAR2, YEAR3, YEAR1, YEAR2, YEAR3           00004840
      WRITE(OUT,104)                                                    00004850
      WRITE(OUT,303)                                                    00004860
303   FORMAT (1X, 'AVERAGE GROSS TUITION PER STUDENT')                  00004870
      WRITE(OUT,304)                                                    00004880
304   FORMAT (1X, '(BEFORE STUDENT AID)', /)                            00004890
      WRITE(OUT,305) (TAB3(1,I), I=1,6)                                 00004900
305   FORMAT (1X, 'PUBLIC 2 YR   ', 2X, 3F9.0, 2X, 3F9.0)               00004910
      WRITE(OUT,307)                                                    00004920
307   FORMAT (1X, 'PUBLIC 4 YR   ')                                     00004930
      WRITE(OUT,309) (TAB3(2,I), I=1,6)                                 00004940
309   FORMAT (1X, '    LOWER DIV ', 2X, 3F9.0, 2X, 3F9.0)               00004950
      WRITE(OUT,311) (TAB3(3,I), I=1,6)                                 00004960
311   FORMAT (1X, '    UPPER DIV ', 2X, 3F9.0, 2X, 3F9.0)               00004970
      WRITE(OUT,313) (TAB3(4,I), I=1,6)                                 00004980
313   FORMAT (1X, '    GRADUATE  ', 2X, 3F9.0, 2X, 3F9.0)               00004990
      DO 315  K = 1,6                                                   00005000
      TOTAL(K)  = 0.0                                                   00005010
315   TOTALX(K) = 0.0                                                   00005020
      DO 317  K = 1,6                                                   00005030
      DO 317  J = 1,4                                                   00005040
      TOTAL(K) = TOTAL(K) + TAB2(J,K)                                   00005050
317   TOTALX(K) = TOTALX(K) + (TAB2(J,K) * TAB3(J,K))                   00005060
      DO 3174  K = 1,6                                                  00005070
      IF (TOTAL(K) .EQ. 0)  GO TO 3174                                  00005080
      TOTAL(K) = TOTALX(K) / TOTAL(K)                                   00005090
3174  CONTINUE                                                          00005100
      WRITE(OUT,319) TOTAL                                              00005110
319   FORMAT (1X, '*  AVERAGE    ', 2X, 3F9.0, 2X, 3F9.0, /)            00005120
      WRITE(OUT,321) (TAB3(5,I), I=1,6)                                 00005130
321   FORMAT (1X, 'PRIVATE 2YR   ', 2X, 3F9.0, 2X, 3F9.0)               00005140
      WRITE(OUT,323)                                                    00005150
323   FORMAT (1X, 'PRIVATE 4YR   ')                                     00005160
      WRITE(OUT,325) (TAB3(6,I), I=1,6)                                 00005170
325   FORMAT (1X, '    LOWER DIV ', 2X, 3F9.0, 2X, 3F9.0)               00005180
      WRITE(OUT,327) (TAB3(7,I), I=1,6)                                 00005190
327   FORMAT (1X, '    UPPER DIV ', 2X, 3F9.0, 2X, 3F9.0)               00005200
      WRITE(OUT,329) (TAB3(8,I), I=1,6)                                 00005210
329   FORMAT (1X, '    GRADUATE  ', 2X, 3F9.0, 2X, 3F9.0)               00005220
      DO 331  K = 1,6                                                   00005230
      TOTAL(K)  = 0.0                                                   00005240
331   TOTALX(K) = 0.0                                                   00005250
      DO 333  K = 1,6                                                   00005260
      DO 333  J = 5,8                                                   00005270
      TOTAL(K) = TOTAL(K) + TAB2(J,K)                                   00005280
333   TOTALX(K) = TOTALX(K) + (TAB2(J,K) * TAB3(J,K))                   00005290
      DO 3314  K = 1,6                                                  00005300
      IF (TOTAL(K) .EQ. 0) GO TO 3314                                   00005310
```

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      TOTAL(K) = TOTALX(K) / TOTAL(K)                                   00005320
3314  CONTINUE                                                          00005330
      WRITE(OUT,335) TOTAL                                              00005340
335   FORMAT (1X, '*  AVERAGE     ', 2X, 3F9.0, 2X, 3F9.0, /)          00005350
      WRITE(OUT,337) (TAB3(9,I), I=1,6)                                 00005360
337   FORMAT (1X, 'NONCOLLEGIATE ', 2X, 3F9.0, 2X, 3F9.0)              00005370
      DO 339  K = 1,6                                                   00005380
      TOTAL(K)  = 0.0                                                   00005390
339   TOTALX(K) = 0.0                                                   00005400
      DO 341  K = 1,6                                                   00005410
      DO 341  J = 1,9                                                   00005420
      TOTAL(K) = TOTAL(K) + TAB2(J,K)                                   00005430
341   TOTALX(K) = TOTALX(K) + (TAB2(J,K) * TAB3(J,K))                   00005440
      DO 3414  K = 1,6                                                  00005450
      IF (TOTAL(K) .EQ. 0)  GO TO 3414                                  00005460
      TOTAL(K) = TOTALX(K) / TOTAL(K)                                   00005470
3414  CONTINUE                                                          00005480
      WRITE(OUT,343) TOTAL                                              00005490
343   FORMAT (1X, /, 1X, '** AVERAGE     ', 2X, 3F9.0, 2X, 3F9.0)       00005500
      WRITE(OUT,251)                                                    00005510
C                                                                       00005520
C                                                                       00005530
C     BEGINNING PAGE 4 - TABLE 3B                                       00005540
C                                                                       00005550
C                                                                       00005560
      WRITE(OUT,345)                                                    00005570
345   FORMAT (1X, /, /, 1X, 32X, 'TABLE 3B', /)                         00005580
      WRITE(OUT,203)                                                    00005590
      WRITE(OUT,205) YEAR1, YEAR2, YEAR3, YEAR1, YEAR2, YEAR3           00005600
      WRITE(OUT,347)                                                    00005610
347   FORMAT (1X, /, 1X, 'AVERAGE NET TUITION PER STUDENT')             00005620
      WRITE(OUT,349)                                                    00005630
349   FORMAT (1X, '(AFTER STUDENT AID)', /)                             00005640
      WRITE(OUT,357) (TAB3(10,I), I=1,6)                                00005650
357   FORMAT (1X, 'PUBLIC 2 YR    ', 2X, 3F9.0, 2X, 3F9.0)              00005660
      WRITE(OUT,359)                                                    00005670
359   FORMAT (1X, 'PUBLIC 4 YR    ')                                    00005680
      WRITE(OUT,361) (TAB3(11,I), I=1,6)                                00005690
361   FORMAT (1X, '    LOWER DIV ', 2X, 3F9.0, 2X, 3F9.0)               00005700
      WRITE(OUT,363) (TAB3(12,I), I=1,6)                                00005710
363   FORMAT (1X, '    UPPER DIV ', 2X, 3F9.0, 2X, 3F9.0)               00005720
      WRITE(OUT,365) (TAB3(13,I), I=1,6)                                00005730
365   FORMAT (1X, '    GRADUATE  ', 2X, 3F9.0, 2X, 3F9.0)               00005740
      DO 367  K = 1,6                                                   00005750
      TOTAL(K)  = 0.0                                                   00005760
367   TOTALX(K) = 0.0                                                   00005770
      DO 369  K = 1,6                                                   00005780
      DO 369  J = 10,13                                                 00005790
      TOTAL(K) = TAB2(J-9,K) + TOTAL(K)                                 00005800
369   TOTALX(K) = (TAB3(J,K) * TAB2(J-9,K)) + TOTALX(K)                 00005810
      DO 371  K = 1,6                                                   00005820
      IF (TOTAL(K) .EQ. 0)  GO TO 371                                   00005830
      TOTAL(K) = TOTALX(K) / TOTAL(K)                                   00005840
371   CONTINUE                                                          00005850
      WRITE(OUT,375) TOTAL                                              00005860
375   FORMAT (1X, '*  AVERAGE     ', 2X, 3F9.0, 2X, 3F9.0, /)          00005870
      WRITE(OUT,377) (TAB3(14,I), I=1,6)                                00005880
377   FORMAT (1X, 'PRIVATE 2YR    ', 2X, 3F9.0, 2X, 3F9.0)              00005890
      WRITE(OUT,379)                                                    00005900
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379   FORMAT (1X, 'PRIVATE 4YR   ')                                          00005910
      WRITE(OUT,381) (TAB3(15,I), I=1,6)                                     00005920
381   FORMAT (1X, '    LOWER DIV ', 2X, 3F9.0, 2X, 3F9.0)                    00005930
      WRITE(OUT,383) (TAB3(16,I), I=1,6)                                     00005940
383   FORMAT (1X, '    UPPER DIV ', 2X, 3F9.0, 2X, 3F9.0)                    00005950
      WRITE(OUT,385) (TAB3(17,I), I=1,6)                                     00005960
385   FORMAT (1X, '    GRADUATE  ', 2X, 3F9.0, 2X, 3F9.0)                    00005970
      DO 387  K = 1,6                                                        00005980
      TOTAL(K)  = 0.0                                                        00005990
387   TOTALX(K) = 0.0                                                        00006000
      DO 389  J = 14,17                                                      00006010
      DO 389  K = 1,6                                                        00006020
      TOTAL(K) = TOTAL(K) + TAB2(J-9,K)                                      00006030
389   TOTALX(K) = TOTALX(K) + (TAB2(J-9,K) * TAB3(J,K))                      00006040
      DO 391  K = 1,6                                                        00006050
      IF (TOTAL(K) .EQ. 0)  GO TO 391                                        00006060
      TOTAL(K) = TOTALX(K) / TOTAL(K)                                        00006070
391   CONTINUE                                                               00006080
      WRITE(OUT,393) TOTAL                                                   00006090
393   FORMAT (1X, '*  AVERAGE    ', 2X, 3F9.0, 2X, 3F9.0, /)                 00006100
      WRITE(OUT,395) (TAB3(18,I), I=1,6)                                     00006110
395   FORMAT (1X, 'NONCOLLEGIATE ', 2X, 3F9.0, 2X, 3F9.0)                    00006120
      DO 396  K = 1,6                                                        00006130
      TOTAL(K)  = 0.0                                                        00006140
396   TOTALX(K) = 0.0                                                        00006150
      DO 397  J = 10,17                                                      00006160
      DO 397  K = 1,6                                                        00006170
      TOTAL(K) = TOTAL(K) + TAB2(J-9,K)                                      00006180
397   TOTALX(K) = TOTALX(K) + (TAB2(J-9,K) * TAB3(J,K))                      00006190
      DO 398  K = 1,6                                                        00006200
      IF (TOTAL(K) .EQ. 0)  GO TO 398                                        00006210
      TOTAL(K) = TOTALX(K) / TOTAL(K)                                        00006220
398   CONTINUE                                                               00006230
      WRITE(OUT,399) TOTAL                                                   00006240
399   FORMAT (1X, /, 1X, '** AVERAGE    ', 2X, 3F9.0, 2X, 3F9.0)             00006250
      WRITE(OUT,251)                                                         00006260
      GO TO 79                                                               00006270
C                                                                            00006280
C                                                                            00006290
C     BEGINNING PAGE 5 - TABLE 4A                                            00006300
C                                                                            00006310
C                                                                            00006320
4     CONTINUE                                                               00006330
      WRITE(OUT,101)                                                         00006340
      WRITE(OUT,104)                                                         00006350
      WRITE(OUT,105) PAGE                                                    00006360
      WRITE(OUT,107) VERSN, DATE                                             00006370
      WRITE(OUT,109) INIT, TIME                                              00006380
      WRITE(OUT,111) RNAME                                                   00006390
      WRITE(OUT,113) YEAR1, YEAR2, YEAR3                                     00006400
      WRITE(OUT,401)                                                         00006410
401   FORMAT (1X, /, 1X, 32X, 'TABLE 4A', /)                                 00006420
      WRITE(OUT,203)                                                         00006430
      WRITE(OUT,205) YEAR1, YEAR2, YEAR3, YEAR1, YEAR2, YEAR3                00006440
      WRITE(OUT,104)                                                         00006450
      WRITE(OUT,403)                                                         00006460
403   FORMAT (1X, 'UNDERGRADUATE ENROLLMENT, ALL')                           00006470
      WRITE(OUT,405)                                                         00006480
405   FORMAT (1X, 'INSTITUTIONS, BY FAMILY INCOME', /)                       00006490
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      WRITE(OUT,407) (TAB4(1,I), I=1,6)                                 00006500
407   FORMAT (1X, '$     0 -   999', 2X, 3F9.0, 2X, 3F9.0)              00006510
      WRITE(OUT,409) (TAB4(2,I), I=1,6)                                 00006520
409   FORMAT (1X, '$ 1,000- 1,999', 2X, 3F9.0, 2X, 3F9.0)               00006530
      WRITE(OUT,411) (TAB4(3,I), I=1,6)                                 00006540
411   FORMAT (1X, '$ 2,000- 2,999', 2X, 3F9.0, 2X, 3F9.0)               00006550
      WRITE(OUT,413) (TAB4(4,I), I=1,6)                                 00006560
413   FORMAT (1X, '$ 3,000- 3,999', 2X, 3F9.0, 2X, 3F9.0)               00006570
      WRITE(OUT,415) (TAB4(5,I), I=1,6)                                 00006580
415   FORMAT (1X, '$ 4,000- 4,999', 2X, 3F9.0, 2X, 3F9.0)               00006590
      WRITE(OUT,417) (TAB4(6,I), I=1,6)                                 00006600
417   FORMAT (1X, '$ 5,000- 5,999', 2X, 3F9.0, 2X, 3F9.0)               00006610
      WRITE(OUT,419) (TAB4(7,I), I=1,6)                                 00006620
419   FORMAT (1X, '$ 6,000- 7,499', 2X, 3F9.0, 2X, 3F9.0)               00006630
      WRITE(OUT,421) (TAB4(8,I), I=1,6)                                 00006640
421   FORMAT (1X, '$ 7,500- 9,999', 2X, 3F9.0, 2X, 3F9.0)               00006650
      WRITE(OUT,423) (TAB4(9,I), I=1,6)                                 00006660
423   FORMAT (1X, '$10,000-14,999', 2X, 3F9.0, 2X, 3F9.0)               00006670
      WRITE(OUT,425) (TAB4(10,I), I=1,6)                                00006680
425   FORMAT (1X, '$15,000-24,999', 2X, 3F9.0, 2X, 3F9.0)               00006690
      WRITE(OUT,427) (TAB4(11,I), I=1,6)                                00006700
427   FORMAT (1X, '$25,000- OVER ', 2X, 3F9.0, 2X, 3F9.0)               00006710
      WRITE(OUT,104)                                                    00006720
      DO 429  K = 1,6                                                   00006730
429   TOTAL(K) = 0.0                                                    00006740
      DO 431  K = 1,6                                                   00006750
      DO 431  J = 1,11                                                  00006760
431   TOTAL(K) = TOTAL(K) + TAB4(J,K)                                   00006770
      WRITE(OUT,433) TOTAL                                              00006780
433   FORMAT (1X, '** TOTAL       ', 2X, 3F9.0, 2X, 3F9.0)              00006790
      WRITE(OUT,251)                                                    00006800
C                                                                       00006810
C                                                                       00006820
C     BEGINNING PAGE 5 - TABLE 48                                       00006830
C                                                                       00006840
C                                                                       00006850
      WRITE(OUT,435)                                                    00006860
435   FORMAT (1X, /, /, 1X, 32X, 'TABLE 48', /)                         00006870
      WRITE(OUT,436)                                                    00006880
436   FORMAT (1X, '---MEASURES---', 2X,                                 00006890
     *'-------ALTERNATIVE---------', 2X,                               00006900
     *'--------ALTERNATIVE---------')                                   00006910
      WRITE(OUT,205) YEAR1, YEAR2, YEAR3, YEAR1, YEAR2, YEAR3           00006920
      WRITE(OUT,104)                                                    00006930
      WRITE(OUT,437)                                                    00006940
437   FORMAT (1X, 18X, 'AID INCREASE PER STUDENT ', 2X,                 00006950
     *1X, 'NET TUITION INCREASE PER')                                   00006960
      WRITE(OUT,439)                                                    00006970
439   FORMAT (1X, 21X, ' BY FAMILY INCOME ', 4X, 2X,                    00006980
     *1X, 'STUDENT BY FAMILY INCOME', /)                                00006990
      WRITE(OUT,441) (TAB5(1,I), I=1,6)                                 00007000
441   FORMAT (1X, '$     0 -   999', 2X, 3F9.0, 2X, 3F9.0)              00007010
      WRITE(OUT,443) (TAB5(2,I), I=1,6)                                 00007020
443   FORMAT (1X, '$ 1,000- 1,999', 2X, 3F9.0, 2X, 3F9.0)               00007030
      WRITE(OUT,445) (TAB5(3,I), I=1,6)                                 00007040
445   FORMAT (1X, '$ 2,000- 2,999', 2X, 3F9.0, 2X, 3F9.0)               00007050
      WRITE(OUT,447) (TAB5(4,I), I=1,6)                                 00007060
447   FORMAT (1X, '$ 3,000- 3,999', 2X, 3F9.0, 2X, 3F9.0)               00007070
      WRITE(OUT,449) (TAB5(5,I), I=1,6)                                 00007080
```

```
449   FORMAT (1X, '$ 4,000- 4,999', 2X, 3F9.0, 2X, 3F9.0)                00007090
      WRITE(OUT, 451) (TAB5(6,I), I=1,6)                                  00007100
451   FORMAT (1X, '$ 5,000- 5,999', 2X, 3F9.0, 2X, 3F9.0)                00007110
      WRITE(OUT, 453) (TAB5(7,I), I=1,6)                                  00007120
453   FORMAT (1X, '$ 6,000- 7,499', 2X, 3F9.0, 2X, 3F9.0)                00007130
      WRITE(OUT, 455) (TAB5(8,I), I=1,6)                                  00007140
455   FORMAT (1X, '$ 7,500- 9,999', 2X, 3F9.0, 2X, 3F9.0)                00007150
      WRITE(OUT,457) (TAB5(9,I), I=1,6)                                   00007160
457   FORMAT (1X, '$10,000-14,999', 2X, 3F9.0, 2X, 3F9.0)                00007170
      WRITE(OUT,459) (TAB5(10,I), I=1,6)                                  00007180
459   FORMAT (1X, '$15,000-24,999', 2X, 3F9.0, 2X, 3F9.0)                00007190
      WRITE(OUT,461) (TAB5(11,I), I=1,6)                                  00007200
461   FORMAT (1X, '$25,000- OVER ', 2X, 3F9.0, 2X, 3F9.0)                00007210
      WRITE(OUT,104)                                                      00007220
      DO 463  K = 1,6                                                     00007230
      TOTAL(K)  = 0.0                                                     00007240
463   TOTALX(K) = 0.0                                                     00007250
      DO 465 K = 1,6                                                      00007260
      DO 465 J = 1,11                                                     00007270
      TOTAL(K) = (TAB4(J,K) + TOTAL(K))                                   00007280
      TOTALX(K) = (TAB5(J,K) * TAB4(J,K)) + TOTALX(K)                     00007290
465   CONTINUE                                                            00007300
      DO 466  K = 1,6                                                     00007310
      IF (TOTAL(K) .EQ. 0)  GO TO 466                                     00007320
      TOTAL(K) = TOTALX(K) / TOTAL(K)                                     00007330
466   CONTINUE                                                            00007340
      WRITE(OUT,467) TOTAL                                                00007350
467   FORMAT (1X, '** AVERAGE    ', 2X, 3F9.0, 2X, 3F9.0)                 00007360
      WRITE(OUT,104)                                                      00007370
      WRITE(OUT,103)                                                      00007380
      WRITE(OUT,251)                                                      00007390
      GO TO 79                                                            00007400
C                                                                         00007410
C                                                                         00007420
C     BEGINNING PAGE 6 - TABLE 5A                                         00007430
C                                                                         00007440
C                                                                         00007450
5     CONTINUE                                                            00007460
      WRITE(OUT,101)                                                      00007470
      WRITE(OUT,104)                                                      00007480
      WRITE(OUT,105) PAGE                                                 00007490
      WRITE(OUT,107) VERSN, DATE                                          00007500
      WRITE(OUT,109) INIT, TIME                                           00007510
      WRITE(OUT,111) RNAME                                                00007520
      WRITE(OUT,113) YEAR1, YEAR2, YEAR3                                  00007530
      WRITE(OUT,501)                                                      00007540
501   FORMAT (1X, /, 1X, 32X, 'TABLE 5A', /)                             00007550
      WRITE(OUT,502)                                                      00007560
502   FORMAT (1X, 12X, '---MEASURES---', 2X,                              00007570
     *6X, '--------ALTERNATIVE--------')                                  00007580
      WRITE(OUT,5022) YEAR1, YEAR2, YEAR3                                 00007590
5022  FORMAT (1X, 34X, 3X, I4, 2X, 3X, I4, 2X, 3X, I4)                   00007600
      WRITE(OUT,104)                                                      00007610
      WRITE(OUT,503)                                                      00007620
503   FORMAT (1X, 12X, 'NET PRICE PER STUDENT ')                          00007630
      WRITE(OUT,505)                                                      00007640
505   FORMAT (1X, 12X, 'BY FAMILY INCOME', /)                             00007650
      DO 507  K = 1,3                                                     00007660
507   TOTAL(K) = TAB5(1,K+3) - TAB5(1,K)                                  00007670
```

```
      WRITE(OUT,509) (TOTAL(I), I=1,3)                                          00007680
509   FORMAT (1X, 12X,  '$     0 -   999', 8X, 3F9.0)                          00007690
      DO 511  K = 1,3                                                           00007700
511   TOTAL(K) = TAB5(2,K+3) - TAB5(2,K)                                        00007710
      WRITE(OUT,513) (TOTAL(I), I=1,3)                                          00007720
513   FORMAT (1X, 12X,  '$ 1,000- 1,999', 8X, 3F9.0)                          00007730
      DO 515  K = 1,3                                                           00007740
515   TOTAL(K) = TAB5(3,K+3) - TAB5(3,K)                                        00007750
      WRITE(OUT,517) (TOTAL(I), I=1,3)                                          00007760
517   FORMAT (1X, 12X,  '$ 2,000- 2,999', 8X, 3F9.0)                          00007770
      DO 519  K = 1,3                                                           00007780
519   TOTAL(K) = TAB5(4,K+3) - TAB5(4,K)                                        00007790
      WRITE(OUT,521) (TOTAL(I), I=1,3)                                          00007800
521   FORMAT (1X, 12X,  '$ 3,000- 3,999', 8X, 3F9.0)                          00007810
      DO 523  K = 1,3                                                           00007820
523   TOTAL(K) = TAB5(5,K+3) - TAB5(5,K)                                        00007830
      WRITE(OUT,525) (TOTAL(I), I=1,3)                                          00007840
525   FORMAT (1X, 12X,  '$ 4,000- 4,999', 8X, 3F9.0)                          00007850
      DO 527  K = 1,3                                                           00007860
527   TOTAL(K) = TAB5(6,K+3) - TAB5(6,K)                                        00007870
      WRITE(OUT,529) (TOTAL(I), I=1,3)                                          00007880
529   FORMAT (1X, 12X,  '$ 5,000- 5,999', 8X, 3F9.0)                          00007890
      DO 531 K = 1,3                                                            00007900
531   TOTAL(K) = TAB5(7,K+3) - TAB5(7,K)                                        00007910
      WRITE(OUT,533) (TOTAL(I), I=1,3)                                          00007920
533   FORMAT (1X, 12X,  '$ 6,000- 7,499', 8X, 3F9.0)                          00007930
      DO 535  K = 1,3                                                           00007940
535   TOTAL(K) = TAB5(8,K+3) - TAB5(8,K)                                        00007950
      WRITE(OUT,537) (TOTAL(I), I=1,3)                                          00007960
537   FORMAT (1X, 12X,  '$ 7,500- 9,999', 8X, 3F9.0)                          00007970
      DO 539  K = 1,3                                                           00007980
539   TOTAL(K) = TAB5(9,K+3) - TAB5(9,K)                                        00007990
      WRITE(OUT,541) (TOTAL(I), I=1,3)                                          00008000
541   FORMAT (1X, 12X,  '$10,000-14,999', 8X, 3F9.0)                          00008010
      DO 543  K = 1,3                                                           00008020
543   TOTAL(K) = TAB5(10,K+3) - TAB5(10,K)                                      00008030
      WRITE(OUT,545) (TOTAL(I), I=1,3)                                          00008040
545   FORMAT (1X, 12X,  '$15,000-24,999', 8X, 3F9.0)                          00008050
      DO 547  K = 1,3                                                           00008060
547   TOTAL(K) = TAB5(11,K+3) - TAB5(11,K)                                      00008070
      WRITE(OUT,549) (TOTAL(I), I=1,3)                                          00008080
549   FORMAT (1X, 12X,  '$25,000- OVER ', 8X, 3F9.0)                          00008090
      DO 551  K=1,6                                                             00008100
      TOTAL(K)  = 0.0                                                           00008110
551   TOTALX(K) = 0.0                                                           00008120
      DO 559  K = 4,6                                                           00008130
      DO 559 J = 1,11                                                           00008140
      TOTAL(K) = TAB4(J,K) + TOTAL(K)                                           00008150
559   TOTALX(K) = TOTALX(K) + (TAB4(J,K) * (TAB5(J,K) - TAB5(J,K-3)))          00008160
      DO 561  K = 4,6                                                           00008170
      IF (TOTAL(K) .EQ.0)  GO TO 561                                            00008180
      TOTAL(K) = TOTALX(K) / TOTAL(K)                                           00008190
561   CONTINUE                                                                  00008200
      WRITE(OUT,104)                                                            00008210
      WRITE(OUT,567) (TOTAL(I), I=4,6)                                          00008220
567   FORMAT (1X, 12X,  '** AVERAGE     ', 8X, 3F9.0)                          00008230
      WRITE(OUT,251)                                                            00008240
C                                                                               00008250
C                                                                               00008260
```

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C     BEGINNING PAGE 6 - TABLE 58                                        00008270
C                                                                        00008280
C                                                                        00008290
      WRITE(OUT,571)                                                     00008300
571   FORMAT (1X, /, /, 1X, 32X, 'TABLE 58', /)                          00008310
      WRITE(OUT,572)                                                     00008320
572   FORMAT (1X, 12X, '---MEASURES---', 2X,                             00008330
     *9X, '--------ALTERNATIVE--------')                                 00008340
      WRITE(OUT,5722) YEAR1, YEAR2, YEAR3                                00008350
5722  FORMAT (1X, 37X, 3X, I4, 2X, 3X, I4, 2X, 3X, I4)                   00008360
      WRITE(OUT,104)                                                     00008370
      WRITE(OUT,573)                                                     00008380
573   FORMAT (1X, 7X, 'COST PER ADDITIONAL STUDENT', /, /)               00008390
      WRITE(OUT,575) (TAB6(1,I), I=1,3)                                  00008400
575   FORMAT (1X, 7X, 'FEDERAL GOVERNMENT', 12X, 3F9.0, /)               00008410
      WRITE(OUT,577) (TAB6(2,I), I=1,3)                                  00008420
577   FORMAT (1X, 7X, 'STATE GOVERNMENTS', 13X, 3F9.0, /)                00008430
      WRITE(OUT,579) (TAB6(3,I), I=1,3)                                  00008440
579   FORMAT (1X, 7X, 'LOCAL GOVERNMENTS', 13X, 3F9.0, /)                00008450
      WRITE(OUT,583) (TAB6(4,I), I=1,3)                                  00008460
583   FORMAT (1X, 7X, 'STUDENT AND FAMILY FUNDS', 6X, 3F9.0, /)          00008470
      WRITE(OUT,581) (TAB6(5,I),I=1,3)                                   00008480
581   FORMAT(1X,7X,'PRIVATE SOURCES OF FUNDS',6X,3F9.0,/)                00008490
      DO 585  K = 1,6                                                    00008500
      TOTAL(K) = 0.0                                                     00008510
585   CONTINUE                                                           00008520
      DO 587  K = 1,3                                                    00008530
      DO 587  J = 1,5                                                    00008540
587   TOTAL(K) = TOTAL(K) + TAB6(J,K)                                    00008550
      WRITE(OUT,589) (TOTAL(I), I=1,3)                                   00008560
589   FORMAT (1X, /, 1X,  7X, '** TOTAL', 22X, 3F9.0)                    00008570
      WRITE(OUT,104)                                                     00008580
      WRITE(OUT,104)                                                     00008590
      WRITE(OUT,103)                                                     00008600
      WRITE(OUT,251)                                                     00008610
      GO TO 79                                                           00008620
C                                                                        00008630
C                                                                        00008640
C     BEGINNING PAGES 7 THROUGH 9, TABLES 6 THROUGH 8                    00008650
C                                                                        00008660
C                                                                        00008670
6     CONTINUE                                                           00008680
C                                                                        00008690
C                                                                        00008700
C     MATRIX RELATED TO TABLE NUMBER HERE -  ITAB ALREADY HAS            00008710
C     BEEN RANGE CHECKED ABOVE                                           00008720
C                                                                        00008730
      IY = ITAB - 5                                                      00008740
C     THIS CONTROLS THE BASIC THREE ALTERNATIVE LOOP                     00008750
C     EACH PRODUCES ONE PAGE OF OUTPUT.                                  00008760
C                                                                        00008770
      WRITE(OUT,104)                                                     00008780
      WRITE(OUT,105) PAGE                                                00008790
      WRITE(OUT,107) VERSN, DATE                                         00008800
      WRITE(OUT,109) INIT, TIME                                          00008810
      IF (ITAB .EQ. 6) IYEAR = YEAR1                                     00008820
      IF (ITAB .EQ. 7) IYEAR = YEAR2                                     00008830
      IF (ITAB .EQ. 8) IYEAR = YEAR3                                     00008840
      WRITE(OUT,111) RNAME                                               00008850
```

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      WRITE(OUT,600) IYEAR                                                    00008860
600   FORMAT (1X, 4X, 'FOR YEAR ', I4)                                        00008870
      WRITE(OUT,601) ITAB                                                     00008880
601   FORMAT (1X, /, 1X, 30X, 'TABLE', I2, /)                                 00008890
      WRITE(OUT,603)                                                          00008900
603   FORMAT (1X, 4X, 'FROM:', 3X, 3X, 'FEDERAL', 2X, 4X, 'STATE',           00008910
     *3X, 4X, 'LOCAL', 3X, 3X, 'STUDENT', 2X, 3X, 'PRIVATE',                  00008920
     */)                                                                      00008930
      WRITE(OUT,605)                                                          00008940
605   FORMAT (1X, 'DIRECT PUBLIC FUNDING DECISIONS', /, 1X, 4X, 'TO:' )       00008950
      WRITE(OUT,607)                                                          00008960
607   FORMAT (1X, 'UNDERGRADUATE')                                            00008970
      WRITE(OUT,609) FAID(IY), (TA87(2,I,IY), I=1,5)                          00008980
609   FORMAT (1X, '  LT $', F6.0, 5F12.0)                                     00008990
      WRITE(OUT,611) FAID(IY), (TA87(1,I,IY), I=1,5)                          00009000
611   FORMAT (1X, '  GE $', F6.0, 5F12.0)                                     00009010
      WRITE(OUT,613) (TA87(3,I,IY), I=1,5)                                    00009020
613   FORMAT (1X, 'GRADUATE     ', 5F12.0)                                    00009030
      WRITE(OUT,615) (TA87(4,I,IY), I=1,5)                                    00009040
615   FORMAT (1X, 'ALL STUDENTS', 5F12.0, /)                                  00009050
      WRITE(OUT,617) (TA87(5,I,IY), I=1,5)                                    00009060
617   FORMAT (1X, 'PUBLIC 2 YR ', 5F12.0)                                     00009070
      WRITE(OUT,619) (TA87(6,I,IY), I=1,5)                                    00009080
619   FORMAT (1X, 'PUBLIC 4 YR ', 5F12.0)                                     00009090
      WRITE(OUT,621) (TA87(7,I,IY), I=1,5)                                    00009100
621   FORMAT (1X, 'PRIVATE      ', 5F12.0)                                    00009110
      WRITE(OUT,623) (TA87(8,I,IY), I=1,5)                                    00009120
623   FORMAT (1X, 'NONCOLLEGTE ', 5F12.0, /)                                  00009130
      WRITE(OUT,625)                                                          00009140
625   FORMAT (1X, 'FEDERAL AID TO: ')                                         00009150
      WRITE(OUT,627) (TA87(9,I,IY), I=1,5)                                    00009160
627   FORMAT (1X, '  STATE GOV ', 5F12.0)                                    00009170
      WRITE(OUT,629) (TA87(10,I,IY), I=1,5)                                   00009180
629   FORMAT (1X, '  LOCAL GOV ', 5F12.0)                                    00009190
      WRITE(OUT,104)                                                          00009200
      WRITE(OUT,631)                                                          00009210
631   FORMAT (1X, 'COST INDUCED BY ENROLLMENT CHANGES', /, 1X, 4X,            00009220
     *'TO:' )                                                                 00009230
      WRITE(OUT,607)                                                          00009240
      WRITE(OUT,609) FAID(IY), (TA88(2,I,IY), I=1,5)                          00009250
      WRITE(OUT,611) FAID(IY), (TA88(1,I,IY), I=1,5)                          00009260
      WRITE(OUT,613) (TA88(3,I,IY), I=1,5)                                    00009270
      WRITE(OUT,615) (TA88(4,I,IY), I=1,5)                                    00009280
      WRITE(OUT,617) (TA88(5,I,IY), I=1,5)                                    00009290
      WRITE(OUT,619) (TA88(6,I,IY), I=1,5)                                    00009300
      WRITE(OUT,621) (TA88(7,I,IY), I=1,5)                                    00009310
      WRITE(OUT,623) (TA88(8,I,IY), I=1,5)                                    00009320
      WRITE(OUT,625)                                                          00009330
      WRITE(OUT,627) (TA88(9,I,IY), I=1,5)                                    00009340
      WRITE(OUT,629) (TA88(10,I,IY), I=1,5)                                   00009350
      WRITE(OUT,104)                                                          00009360
      WRITE(OUT,637)                                                          00009370
637   FORMAT (1X, 'NET CHANGE IN FUNDING', /, 1X, 4X, 'TO:')                  00009380
      WRITE(OUT,607)                                                          00009390
      WRITE(OUT,609) FAID(IY), (TA89(2,I,IY), I=1,5)                          00009400
      WRITE(OUT,611) FAID(IY), (TA89(1,I,IY), I=1,5)                          00009410
      WRITE(OUT,613) (TA89(3,I,IY), I=1,5)                                    00009420
      WRITE(OUT,615) (TA89(4,I,IY), I=1,5)                                    00009430
      WRITE(OUT,617) (TA89(5,I,IY), I=1,5)                                    00009440
```

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      WRITE(OUT,619) (TAB9(6,I,IY), I=1,5)                                  00009450
      WRITE(OUT,621) (TAB9(7,I,IY), I=1,5)                                  00009460
      WRITE(OUT,623) (TAB9(8,I,IY), I=1,5)                                  00009470
      WRITE(OUT,625)                                                        00009480
      WRITE(OUT,627) (TAB9(9,I,IY), I=1,5)                                  00009490
      WRITE(OUT,629) (TAB9(10,I,IY), I=1,5)                                 00009500
      WRITE(OUT,251)                                                        00009510
699   CONTINUE                                                              00009520
      GO TO 79                                                              00009530
C                                                                           00009540
C                                                                           00009550
1     CONTINUE                                                              00009560
C                                                                           00009570
C                                                                           00009580
C     SUMMARY TABLE 1 (ADDED IN VERSION 1.2)                                00009590
C                                                                           00009600
      WRITE(OUT,104)                                                        00009610
      WRITE(OUT,105) PAGE                                                   00009620
      WRITE(OUT,107) VERSN, DATE                                            00009630
      WRITE(OUT,109) INIT, TIME                                             00009640
      WRITE(OUT,111) RNAME                                                  00009650
      WRITE(OUT,801)                                                        00009660
801   FORMAT (1X, /, 27X, 'TABLE 1 - SUMMARY', /)                           00009670
      WRITE(OUT,803) YEAR1, YEAR2, YEAR3                                    00009680
803   FORMAT (1X, 36X, 5X, I4, 3X, 5X, I4, 3X, 5X, I4)                      00009690
      WRITE(OUT,807)                                                        00009700
807   FORMAT (1X, 'I.   PROPOSED POLICY CHANGES', /)                        00009710
      WRITE(OUT,809) (TAB10(1,I), I=1,3)                                    00009720
809   FORMAT (1X, 'ADDITIONAL STUDENT AID, FEDERAL      ', 3F12.0)          00009730
      WRITE(OUT,811) (TAB10(3,I), I=1,3)                                    00009740
811   FORMAT (1X, '  MAXIMUM ELIGIBLE FAMILY INCOME     ', 3F12.0)         00009750
      WRITE(OUT,813) (TAB10(2,I), I=1,3)                                    00009760
813   FORMAT (1X, 'ADDITIONAL STUDENT AID, STATE        ', 3F12.0)          00009770
      WRITE(OUT,815) (TAB10(4,I), I=1,3)                                    00009780
815   FORMAT (1X, '  MAXIMUM ELIGIBLE FAMILY INCOME     ', 3F12.0)         00009790
      WRITE(OUT,817) (TAB10(5,I), I=1,3)                                    00009800
817   FORMAT (1X, 'ADDITIONAL INSTITUTIONAL AID,FEDERAL', 3F12.0)           00009810
      K = 5                                                                 00009820
      IF (FKOD(1) .EQ. 0) K = 6                                             00009830
      IF (FKOD(1) .EQ. 1) K = 1                                             00009840
      IF (FKOD(1) .EQ. 2) K = 2                                             00009850
      IF (FKOD(1) .EQ. 3) K = 3                                             00009860
      IF (FKOD(1) .EQ. 4) K = 4                                             00009870
      WRITE(OUT,819) (TYPDES(J,K), J=1,5)                                   00009880
819   FORMAT (1X, 2X, 5A4)                                                  00009890
      WRITE(OUT,821) (TAB10(6,I), I=1,3)                                    00009900
821   FORMAT (1X, 'ADDITIONAL INSTITUTIONAL AID, STATE ', 3F12.0)           00009910
      K = 5                                                                 00009920
      IF (FKOD(2) .EQ. 0) K = 6                                             00009930
      IF (FKOD(2) .EQ. 1) K = 1                                             00009940
      IF (FKOD(2) .EQ. 2) K = 2                                             00009950
      IF (FKOD(2) .EQ. 3) K = 3                                             00009960
      IF (FKOD(2) .EQ. 4) K = 4                                             00009970
      WRITE(OUT,823) (TYPDES(J,K), J=1,5)                                   00009980
823   FORMAT (1X, 2X, 5A4)                                                  00009990
      WRITE(OUT,825) (TAB10(7,I), I=1,3)                                    00010000
825   FORMAT (1X, 'FEDERAL TRANSFERS, LOCAL GOVERNMENT ', 3F12.0)           00010010
      WRITE(OUT,827) (TAB10(8,I), I=1,3)                                    00010020
827   FORMAT (1X, 'FEDERAL TRANSFERS, STATE GOVERNMENT ', 3F12.0)           00010030
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RPT

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      WRITE(OUT,829) (TAB10(9,I), I=1,3)                                    00010040
829   FORMAT (1X, '* TOTAL FEDERAL TRANSFERS                ', 3F12.0)     00010050
      WRITE(OUT,831)                                                        00010060
831   FORMAT (1X, 'AVERAGE TUITION BEFORE STUDENT AID  ')                   00010070
      WRITE(OUT,833) (TAB10(10,I), I=1,3)                                   00010080
833   FORMAT (1X, '    PUBLIC  2 YEAR                      ', 3F12.0)     00010090
      WRITE(OUT,835) (TAB10(11,I), I=1,3)                                   00010100
835   FORMAT (1X, '    PUBLIC  4 YEAR, LOWER DIVISION      ', 3F12.0)     00010110
      WRITE(OUT,837) (TAB10(12,I), I=1,3)                                   00010120
837   FORMAT (1X, '    PUBLIC  4 YEAR, UPPER DIVISION      ', 3F12.0)     00010130
      WRITE(OUT,839) (TAB10(13,I), I=1,3)                                   00010140
839   FORMAT (1X, '    PUBLIC  4 YEAR, GRADUATE            ', 3F12.0)     00010150
      WRITE(OUT,841) (TAB10(14,I), I=1,3)                                   00010160
841   FORMAT (1X, '    PRIVATE, UNDERGRADUATE              ', 3F12.0)     00010170
      WRITE(OUT,843) (TAB10(15,I), I=1,3)                                   00010180
843   FORMAT (1X, '    PRIVATE, GRADUATE                   ', 3F12.0)     00010190
      WRITE(OUT,845) (TAB10(16,I), I=1,3)                                   00010200
845   FORMAT (1X, 'NONCOLLEGIATE                            ', 3F12.0, /)  00010210
      WRITE(OUT,847)                                                        00010220
847   FORMAT (1X, 'II.  PROJECTED PERCENT CHANGES FROM FORECAST ENROLLME00010230
     *NT', /)                                                               00010240
      WRITE(OUT,851) (TAB10(17,I), I=1,3)                                   00010250
851   FORMAT (1X, 'PUBLIC  2 YEAR                           ', 3(F10.2, ' %')00010260
     *)                                                                     00010270
      WRITE(OUT,853) (TAB10(18,I), I=1,3)                                   00010280
853   FORMAT (1X, 'PUBLIC  4 YEAR, LOWER DIVISION           ', 3(F10.2, ' %')00010290
     *)                                                                     00010300
      WRITE(OUT,855) (TAB10(19,I), I=1,3)                                   00010310
855   FORMAT (1X, 'PUBLIC  4 YEAR, UPPER DIVISION           ', 3(F10.2, ' %')00010320
     *)                                                                     00010330
      WRITE(OUT,857) (TAB10(20,I), I=1,3)                                   00010340
857   FORMAT (1X, 'PUBLIC  4 YEAR, GRADUATE                 ', 3(F10.2, ' %')00010350
     *)                                                                     00010360
      WRITE(OUT,859) (TAB10(21,I), I=1,3)                                   00010370
859   FORMAT (1X, 'PRIVATE, UNDERGRADUATE                   ', 3(F10.2, ' %')00010380
     *)                                                                     00010390
      WRITE(OUT,861) (TAB10(22,I), I=1,3)                                   00010400
861   FORMAT (1X, 'PRIVATE, GRADUATE                        ', 3(F10.2, ' %')00010410
     *)                                                                     00010420
      WRITE(OUT,863) (TAB10(23,I), I=1,3)                                   00010430
863   FORMAT (1X, 'NONCOLLEGIATE                            ',3(F10.2, ' %') 00010440
     *)                                                                     00010450
      WRITE(OUT,865) (TAB10(24,I), I=1,3)                                   00010460
865   FORMAT (1X, 'UNDERGRADUATE, LESS THAN  $10,000        ', 3(F10.2, ' %')00010470
     *)                                                                     00010480
      WRITE(OUT,867) (TAB10(25,I), I=1,3)                                   00010490
867   FORMAT (1X, 'UNDERGRADUATE, $10,000 TO $14,999        ', 3(F10.2, ' %')00010500
     *)                                                                     00010510
      WRITE(OUT,869) (TAB10(26,I), I=1,3)                                   00010520
869   FORMAT (1X, 'UNDERGRADUATE, $15,000 AND OVER          ', 3(F10.2, ' %')00010530
     *, /)                                                                  00010540
      WRITE(OUT,871)                                                        00010550
871   FORMAT (1X, 'III. PROJECTED FINANCING CHANGES', /)                    00010560
      WRITE(OUT,873) (TAB10(27,I), I=1,3)                                   00010570
873   FORMAT (1X, 'TOTAL INCREMENTAL COST, FEDERAL          ', 3F12.0)     00010580
      WRITE(OUT,875) (TAB10(28,I), I=1,3)                                   00010590
875   FORMAT (1X, 'TOTAL INCREMENTAL COST, STATE            ', 3F12.0)     00010600
      WRITE(OUT,877) (TAB10(29,I), I=1,3)                                   00010610
877   FORMAT (1X, 'TOTAL INCREMENTAL COST, LOCAL            ', 3F12.0)     00010620
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      WRITE(OUT,879) (TAB10(30,I), I=1,3)                                    00010630
879   FORMAT (1X, '*  TOTAL GOVERNMENTAL INCRMNTAL COST', 3F12.0)            00010640
      WRITE(OUT,881) (TAB10(31,I), I=1,3)                                    00010650
881   FORMAT (1X, 'TOTAL INCREMENTAL COST, PRIVATE     ', 3F12.0)           00010660
      WRITE(OUT,883) (TAB10(32,I), I=1,3)                                    00010670
883   FORMAT (1X, 'TOTAL INCREMENTAL COST, FAMILY & STU', 3F12.0)            00010680
      WRITE(OUT,885) (TAB10(33,I), I=1,3)                                    00010690
885   FORMAT (1X, '** TOTAL INCREMENTAL COST           ', 3F12.0)           00010700
      WRITE(OUT,887) (TAB10(34,I), I=1,3)                                    00010710
887   FORMAT (1X, 'ADD TUITION REVENUE FOR STUDENT AID ', 3F12.0, /)         00010720
      WRITE(OUT,889)                                                         00010730
889   FORMAT (1X, 'IV.  PROJECTED COST PER ADDITIONAL STUDENT', /)           00010740
      WRITE(OUT,891) (TAB6(1,I), I=1,3)                                      00010750
891   FORMAT (1X, 'COST BORNE BY FEDERAL GOVERNMENT    ', 3F12.0)           00010760
      WRITE(OUT,892) (TAB6(2,I), I=1,3)                                      00010770
892   FORMAT (1X, 'COST BORNE BY STATE GOVERNMENTS     ', 3F12.0)           00010780
      WRITE(OUT,893) (TAB6(3,I), I=1,3)                                      00010790
893   FORMAT (1X, 'COST BORNE BY LOCAL GOVERNMENTS     ', 3F12.0)           00010800
      WRITE(OUT,894) (TAB6(4,I), I=1,3)                                      00010810
894   FORMAT (1X, 'COST BORNE BY STUDENT AND FAMILY    ', 3F12.0)           00010820
      WRITE(OUT,895) (TAB6(5,I), I=1,3)                                      00010830
895   FORMAT (1X, 'COST FROM PRIVATE SOURCES OF FUNDS  ', 3F12.0)           00010840
      DO 896 K = 1,6                                                         00010850
      TOTAL(K) = 0.0                                                         00010860
896   CONTINUE                                                               00010870
      DO 897 K = 1,3                                                         00010880
      DO 897 J = 1,5                                                         00010890
897   TOTAL(K) = TOTAL(K) + TAB6(J,K)                                        00010900
      WRITE(OUT,898) (TOTAL(I), I=1,3)                                       00010910
898   FORMAT (1X, '** TOTAL COST PER ADDITIONAL STUDENT', 3F12.0)            00010920
      WRITE(OUT,251)                                                         00010930
      GO TO 79                                                               00010940
999   CONTINUE                                                               00010950
      WRITE(OUT,991)                                                         00010960
991   FORMAT (1X, 'NCFP05 I  REPORTS COMPLETED')                             00010970
      END                                                                    00010980
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U.S. GOVERNMENT PRINTING OFFICE : 1974 O - 530-533